## Electronic supplementary information (ESI)

### *Synthesis of 1*

Cobalt(II) acetate (1 mmol $Co(C_2H_3O_2)_2{\cdot}4H_2O$, 0.2491 g) was dissolved in 20 $cm^3$ water and 2,6-dimethanolpyridine (2 mmol, 0.2783 g) washed down with 10 $cm^3$ of water and resulting mixture was few minutes stirred, then 3,5-dinitrobenzoic acid (2 mmol, 0.4242 g) was washed down with 10 $cm^3$ of water and resulting mixture was stirred for 2 hours and after filtration was left for crystal crystallization under ambient temperature. Light pink-red crystals were collected after four days, yield 0.199 g and were suitable for X-Ray data collection. Elemental analysis for [Co(*pydm*)$_2$](*dnbz*)$_2$; found: N 10.96, C 44.19, H 3.00, calc.: N 11.07, C 44.28, H 3.18 %.

### *Synthesis of 1a-1c*

According to the preparation steps of **1**, zinc dopants were prepared using cobalt(II) acetate and zinc(II) acetate in molar ratios Co:Zn as 0.5 mmol/0.5 mmol **1a**; 0.3 mmol/0.7 mmol **1b**; 0.7 mmol/0.3 mmol **1c**. Light pink-red crystals in all cases were obtained by a slow evaporation at the ambient temperature in six days. Colour intensity has been reduced in the order **1**, **1c**, **1a**, and **1b**. The exact content Co:Zn has been determined by single crystal X-ray structure analysis (see below). Yield: 0.090 g (1a), 0.080 g (1b), 0.110 g (1c).

### *Synthesis of 2*

Zink (II) acetate (1 mmol $Zn(C_2H_3O_2)_2{\cdot}2H_2O$, 0.2195 g) was dissolved in 20 $cm^3$ water and 2,6-dimethanolpyridine (2 mmol, 0.2783 g) washed down with 10 $cm^3$ of water and resulting mixture was few minutes stirred, then 3,5-dinitrobenzoic acid (2 mmol, 0.4242 g) was washed down with 10 $cm^3$ of water and resulting mixture was stirred for 2 hours and after filtration was left for crystal crystallization under ambient temperature. Colourless crystals were obtained by a slow evaporation at the ambient temperature in six days. Yield: 0.050 g.

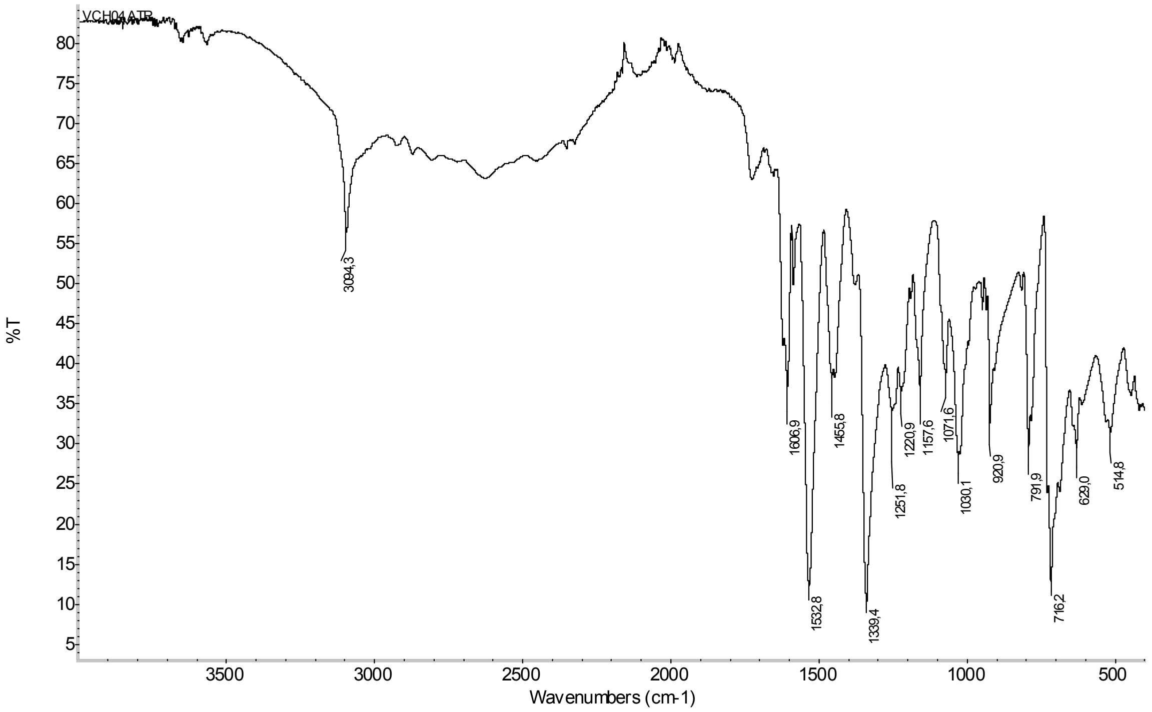


Figure S1. IR spectrum of **1**.

## *X-ray structure determination*

Table S1. Crystal data and structure refinement for **1**, **1a**, **1b**, **1c** and **2**

| | **1** | **1c** | **1a** | **1b** | **2** |
|---|---|---|---|---|---|
| Empirical formula | $C_{28}H_{24}CoN_6O_{16}$ | $C_{28}H_{24}Co_{0.86}N_6O_{16}Zn_{0.14}$ | $C_{28}H_{24}Co_{0.65}N_6O_{16}Zn_{0.35}$ | $C_{28}H_{24}Co_{0.41}N_6O_{16}Zn_{0.59}$ | $C_{28}H_{24}ZnN_6O_{16}$ |
| Formula weight | 759.46 | 760.36 | 761.71 | 763.26 | 765.90 |
| Temperature/K | 100 | 100 | 100 | 100 | 100 |
| Crystal system | triclinic | triclinic | triclinic | triclinic | triclinic |
| Space group | P-1 | P-1 | P-1 | P-1 | P-1 |
| a/Ĺ | 7.9759(4) | 7.9916(3) | 7.9844(2) | 7.9833(2) | 7.9839(2) |
| b/Ĺ | 13.8721(7) | 13.8557(5) | 13.8493(3) | 13.8475(3) | 13.8549(3) |
| c/Ĺ | 14.7030(7) | 14.6907(5) | 14.6890(4) | 14.7060(4) | 14.6856(3) |
| á/° | 96.108(4) | 96.040(3) | 96.049(2) | 96.090(2) | 96.032(2) |
| â/° | 105.136(4) | 104.948(3) | 104.960(2) | 104.877(2) | 104.763(2) |
| ă/° | 100.589(4) | 100.628(3) | 100.467(2) | 100.495(2) | 100.517(2) |
| Volume/Ĺ$^3$ | 1523.03(14) | 1524.55(10) | 1523.17(7) | 1524.83(7) | 1524.69(6) |
| Z | 2 | 2 | 2 | 2 | 2 |
| ń$_{calc}$g/cm$^3$ | 1.656 | 1.656 | 1.661 | 1.662 | 1.668 |
| ě/mm$^{-1}$ | 5.231 | 4.765 | 4.077 | 3.282 | 1.932 |
| F(000) | 778.0 | 779.0 | 780.0 | 782.0 | 784.0 |
| Crystal size/mm$^3$ | 0.23 × 0.21 × 0.1 | 0.35 × 0.25 × 0.25 | 0.45 × 0.35 × 0.35 | 0.35 × 0.35 × 0.35 | 0.45 × 0.35 × 0.35 |
| Radiation | CuKá (ë = 1.54186) | CuKá (ë = 1.54186) | CuKá (ë = 1.54186) | CuKá (ë = 1.54186) | CuKá (ë = 1.54186) |
| 2Č range for data collection/° | 6.312 to 143.334 | 6.576 to 142.624 | 6.31 to 143.268 | 6.3 to 142.512 | 6.304 to 142.48 |
| Index ranges | -9 ≤ h ≤ 9, -11 ≤ k ≤ 16, -18 ≤ l ≤ 13 | -5 ≤ h ≤ 9, -16 ≤ k ≤ 16, -17 ≤ l ≤ 17 | -9 ≤ h ≤ 7, -17 ≤ k ≤ 15, -18 ≤ l ≤ 16 | -9 ≤ h ≤ 9, -17 ≤ k ≤ 16, -8 ≤ l ≤ 17 | -9 ≤ h ≤ 8, -8 ≤ k ≤ 16, -17 ≤ l ≤ 17 |
| Reflections collected | 34832 | 31090 | 32880 | 33083 | 40949 |
| Independent reflections | 5753 [$R_{int}$ = 0.0982, $R_{sigma}$ = 0.0554] | 5710 [$R_{int}$ = 0.0649, $R_{sigma}$ = 0.0452] | 5759 [$R_{int}$ = 0.0439, $R_{sigma}$ = 0.0225] | 5740 [$R_{int}$ = 0.0217, $R_{sigma}$ = 0.0145] | 5699 [$R_{int}$ = 0.0232, $R_{sigma}$ = 0.0110] |
| Data/restraints/parameters | 5753/0/460 | 5710/0/461 | 5759/0/462 | 5740/0/462 | 5699/0/461 |
| Goodness-of-fit on F$^2$ | 0.948 | 1.066 | 1.085 | 1.018 | 1.105 |
| Final R indexes [I >= 2ó (I)] | $R_1$ = 0.0367, $wR_2$ = 0.0887 | $R_1$ = 0.0776, $wR_2$ = 0.2370 | $R_1$ = 0.0402, $wR_2$ = 0.1083 | $R_1$ = 0.0239, $wR_2$ = 0.0580 | $R_1$ = 0.0308, $wR_2$ = 0.0772 |
| Final R indexes [all data] | $R_1$ = 0.0410, $wR_2$ = 0.0901 | $R_1$ = 0.0964, $wR_2$ = 0.2552 | $R_1$ = 0.0423, $wR_2$ = 0.1111 | $R_1$ = 0.0265, $wR_2$ = 0.0591 | $R_1$ = 0.0314, $wR_2$ = 0.0776 |
| Largest diff. peak/hole / e Ĺ$^{-3}$ | 0.54/-0.50 | 1.80/-0.74 | 0.46/-0.52 | 0.29/-0.29 | 0.41/-0.46 |
| CCDC code | 1533249 | 1562423 | 1562424 | 1562425 | 1562426 |

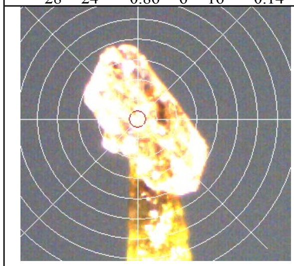
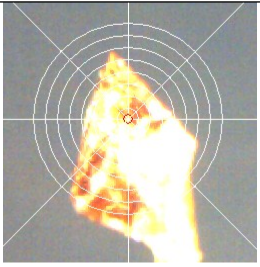
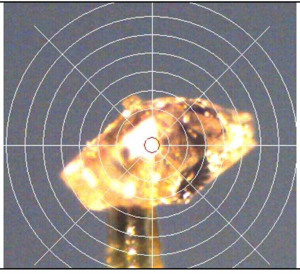
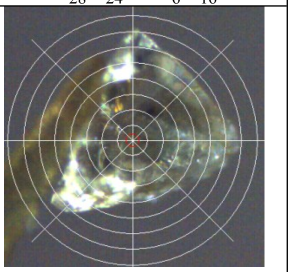
| **1c** | **1a** | **1b** | **2** |
|---|---|---|---|
| $C_{28}H_{24}Co_{0.86}N_6O_{16}Zn_{0.14}$ | $C_{28}H_{24}Co_{0.65}N_6O_{16}Zn_{0.35}$ | $C_{28}H_{24}Co_{0.41}N_6O_{16}Zn_{0.59}$ | $C_{28}H_{24}ZnN_6O_{16}$ |
|  |  |  |  |

Figure S2. Single crystals mounted at the diffractometer.

Table S2. Bond lengths and bond angles in **1**.

| | | |
|---|---|---|
| Co1 | O1 | 2.1455(13) |
| Co1 | O2 | 2.0777(13) |
| Co1 | O3 | 2.1855(14) |
| Co1 | O4 | 2.1580(13) |
| Co1 | N1 | 2.0364(16) |
| Co1 | N2 | 2.0403(16) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| O1 | Co1 | O3 | 95.71(5) | N1 | Co1 | O1 | 76.65(6) |
| O1 | Co1 | O4 | 89.46(5) | N1 | Co1 | O2 | 77.68(6) |
| O2 | Co1 | O1 | 151.88(5) | N1 | Co1 | O3 | 91.06(6) |
| O2 | Co1 | O3 | 96.06(5) | N1 | Co1 | O4 | 114.76(6) |
| O2 | Co1 | O4 | 90.96(5) | N1 | Co1 | N2 | 166.77(6) |
| O4 | Co1 | O3 | 154.16(5) | N2 | Co1 | O1 | 99.31(6) |
| | | | | N2 | Co1 | O2 | 108.22(6) |
| | | | | N2 | Co1 | O3 | 76.70(6) |
| | | | | N2 | Co1 | O4 | 77.48(6) |

Table S3 Hydrogen Bonds in **1**.

| **D– H A** | **d(D-H)/Ĺ** | **d(H-A)/Ĺ** | **d(D-A)/Ĺ** | **D-H-A/°** |
|---|---|---|---|---|
| O1–H1···O11 | 0.87 | 1.70 | 2.559(2) | 167 |
| O2–H2···O6 | 0.87 | 1.66 | 2.533(2) | 177 |
| O3–H3···O12 | 0.87 | 1.74 | 2.592(2) | 165 |
| O4–H4···O5 | 0.87 | 1.75 | 2.586(2) | 159 |

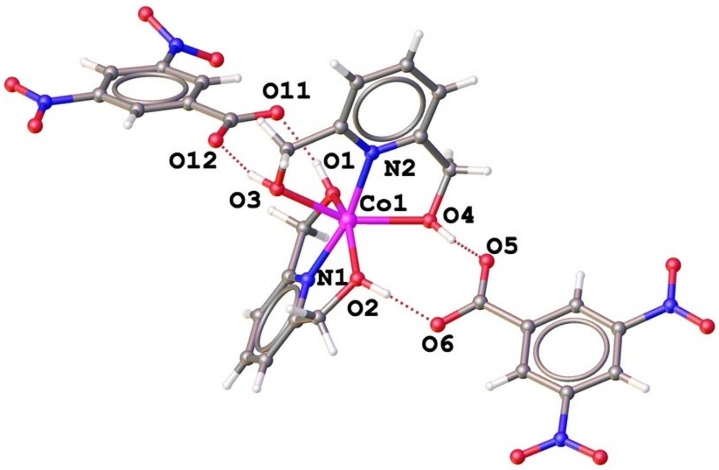


Figure S3. Labelling of atoms for the identification of metal-ligand and hydrogen bonds in **1**.

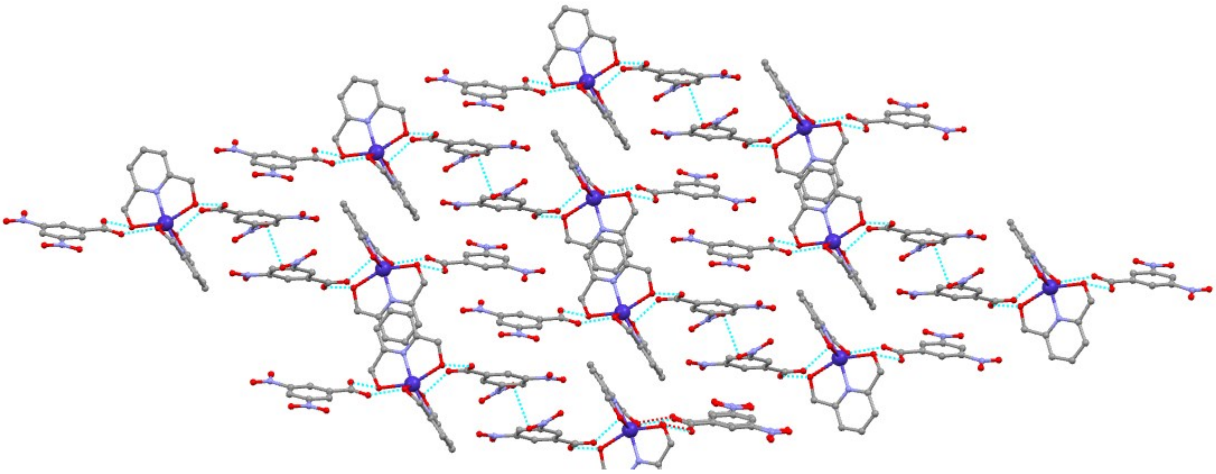


Figure S4. View of the crystal packing for **1**.

## *Electronic spectra*

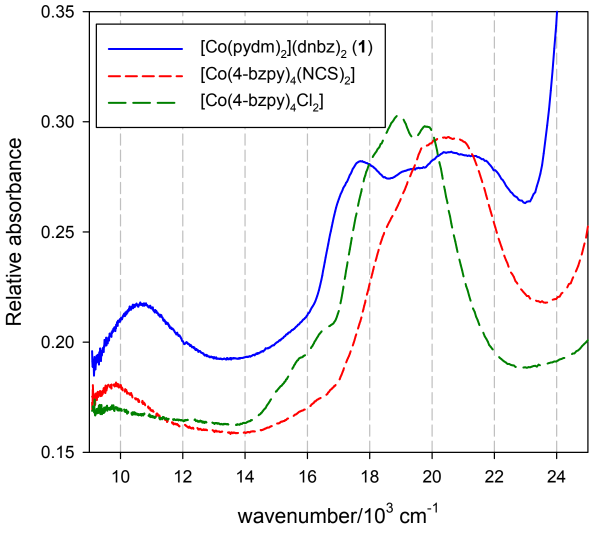


Figure S5. Solid-state UV-Vis absorption spectrum for **1** (solid) taken in the Nujol suspension (Specord 250 Plus spectrometer, Analytica Jena). Peak assignment in the octahedral approximation: ${}^4T_{2g} \leftarrow {}^4T_{1g}$ (F) [10600], ${}^4A_{2g} \leftarrow {}^4T_{1g}$ (F) [17700] and ${}^4T_{1g}$ (P) $\leftarrow {}^4T_{1g}$ [20500 cm$^{-1}$]. Spectra of square bipyramidal complexes [Co(4-bzpy)$_4$(NCS)$_2$] and [Co(4-bzpy)$_4$Cl$_2$] complexes (dashed, red and green, respectively) are drawn for comparison.

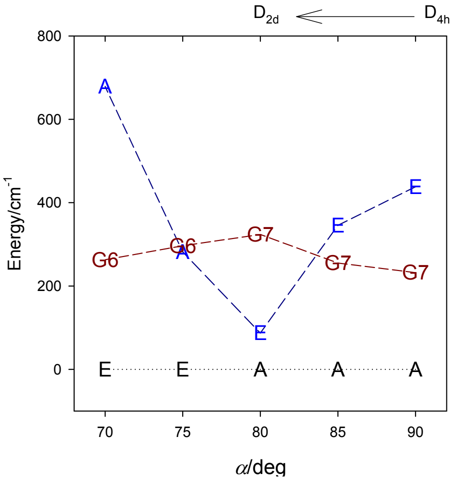


Figure S6. Calculated energies of the crystal field terms (A, E) and multiplets (G6, G7) on angular distortion of square pyramid $D_{4h}$ to $D_{2d}$ *via* angle $\alpha$ bisecting O-Co-O. Expt.: $2\alpha$ = O2-Co1-O1 = 151.88 and O4-Co1-O3 = 154.16 deg.

## *FT-IR spectra*

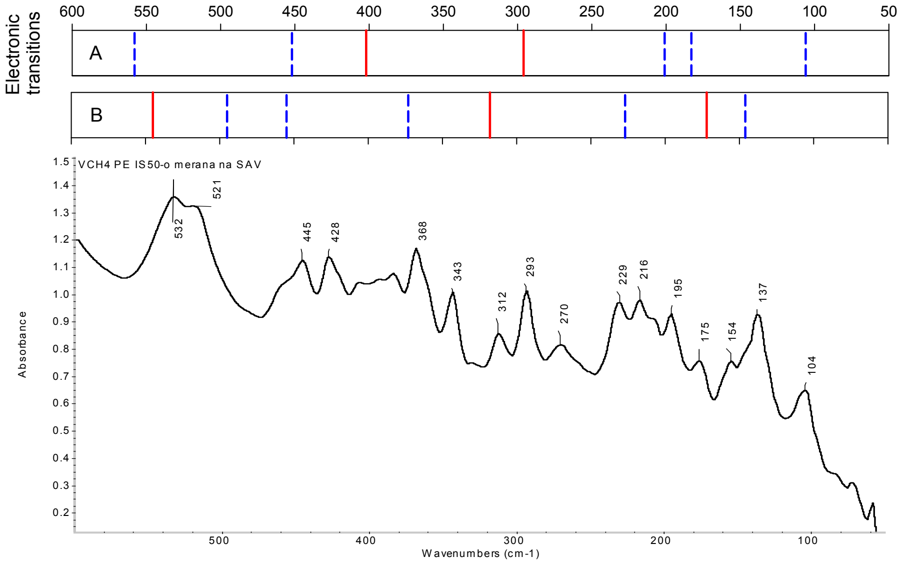


Figure S7. FT-IR spectra in the Far region. Band A – calculated electronic transitions by the crystal field model; band B – calculated by the Griffith-Figgis model of the magnetic data fitting; solid-red – from the ground multiplet, dashed-blue – among excited multiplets.

Table S4. Calculated electronic transitions in the Far-IR region

A) according to the crystal field model

| | $1\Gamma_6$ | $2\Gamma_6$ | $1\Gamma_7$ | $2\Gamma_7$ | $3\Gamma_6$ |
|---|---|---|---|---|---|
| $2\Gamma_6$ | **296** | - | | | |
| $1\Gamma_7$ | **402** | 106 | - | | |
| $2\Gamma_7$ | 854 | 558 | 452 | - | |
| $3\Gamma_6$ | 1037 | 741 | 635 | 183 | - |
| $3\Gamma_7$ | 1055 | 759 | 653 | 201 | 18 |

B) by magnetic data fitting (Griffith-Figgis model)

| | $1\Gamma_6$ | $2\Gamma_6$ | $1\Gamma_7$ | $2\Gamma_7$ | $3\Gamma_6$ |
|---|---|---|---|---|---|
| $2\Gamma_6$ | **172** | 0 | | | |
| $1\Gamma_7$ | **318** | 146 | 0 | | |
| $2\Gamma_7$ | **545** | 373 | 227 | 0 | |
| $3\Gamma_6$ | 1000 | 828 | 682 | 455 | 0 |
| $3\Gamma_7$ | 1040 | 868 | 722 | 495 | 40 |

C) by *ab initio* (ORCA) calculations

| | $1\Gamma_6$ | $2\Gamma_6$ | $1\Gamma_7$ | $2\Gamma_7$ | $3\Gamma_6$ |
|---|---|---|---|---|---|
| $2\Gamma_6$ | **194** | - | | | |
| $1\Gamma_7$ | 876 | 682 | - | | |
| $2\Gamma_7$ | 1111 | 917 | 235 | - | |
| $3\Gamma_6$ | 2487 | 2293 | 1611 | 1376 | - |
| $3\Gamma_7$ | 2573 | 2379 | 1697 | 1462 | 86 |

## AC susceptibility

Fitting of the AC susceptibility data is based upon 44 data points (22 in-phase and 22 out-of-phase) using the formula for the **two-set Debye model**

$$\chi(\omega)=\chi_S+\frac{\chi_{T1}-\chi_S}{1+(\mathrm{i}\omega\tau_1)^{1-\alpha_1}}+\frac{\chi_{T2}-\chi_{T1}}{1+(\mathrm{i}\omega\tau_2)^{1-\alpha_2}} \quad \text{or}$$

$$\chi(\omega)=\chi_S+(\chi_T-\chi_S)\left[\frac{x_1}{1+(\mathrm{i}\omega\tau_1)^{1-\alpha_1}}+\frac{1-x_1}{1+(\mathrm{i}\omega\tau_2)^{1-\alpha_2}}\right]$$

where $x_1$ is the weight of the first, low-frequency relaxation set (channel, branch). This equation decomposes into two explicit formulae for
a) the in-phase component

$$\chi'(\omega)=\chi_S+(\chi_{T1}-\chi_S)\frac{1+(\omega\tau_1)^{1-\alpha_1}\sin(\pi\alpha_1/2)}{1+2(\omega\tau_1)^{1-\alpha_1}\sin(\pi\alpha_1/2)+(\omega\tau_1)^{2-2\alpha_1}}+(\chi_{T2}-\chi_{T1})\frac{1+(\omega\tau_2)^{1-\alpha_2}\sin(\pi\alpha_2/2)}{1+2(\omega\tau_2)^{1-\alpha_2}\sin(\pi\alpha_2/2)+(\omega\tau_2)^{2-2\alpha_2}}$$

b) the out-of-phase component

$$\chi''(\omega)=(\chi_{T1}-\chi_S)\frac{(\omega\tau_1)^{1-\alpha_1}\cos(\pi\alpha_1/2)}{1+2(\omega\tau_1)^{1-\alpha_1}\sin(\pi\alpha_1/2)+(\omega\tau_1)^{2-2\alpha_1}}+(\chi_{T2}-\chi_{T1})\frac{(\omega\tau_2)^{1-\alpha_2}\cos(\pi\alpha_2/2)}{1+2(\omega\tau_2)^{1-\alpha_2}\sin(\pi\alpha_2/2)+(\omega\tau_2)^{2-2\alpha_2}}$$

with the constraint for the isothermal susceptibilities $\chi_{T1}<\chi_{T2}$ in order to get positive contributions from each primitive component. Then $x_1=(\chi_{T1}-\chi_S)/(\chi_{T2}-\chi_S)=(\chi_S-\chi_{T1})/(\chi_S-\chi_{T2})$.

Seven free parameters ($\chi_S$, $\chi_{T1}$, $\chi_{T2}$, $\alpha_1$, $\alpha_2$, $\tau_1$, and $\tau_2$) can be fitted reliably by using 44 experimental data points. The functional to be minimized accounts to the relative errors of both susceptibility components

- $F=w\cdot E(\chi')+(1-w)\cdot E(\chi'')$ with the typical weight $w$ = 0.07, or
- $F=E(\chi')\cdot E(\chi'')$ with $E(\chi)=(1/N)\left[\sum_i^N\left|(\chi_i^{\mathrm{e}}-\chi_i^{\mathrm{c}})/\chi_i^{\mathrm{e}}\right|\right]$

Table S5. Results of the fitting procedure for AC susceptibility components of **1.**
a) at $B_{\mathrm{DC}}$ = 0.2 with a two-set Debye model

| $T$/K | $R(\chi')$ /% | $R(\chi'')$ /% | $\chi_S$ | $\chi_{\mathrm{LF}}$ | $\alpha_{\mathrm{LF}}$ | $\tau_{\mathrm{LF}}$ /$10^{-3}$ s | $\chi_{\mathrm{HF}}$ | $\alpha_{\mathrm{HF}}$ | $\tau_{\mathrm{HF}}$ /$10^{-3}$ s | $x_{\mathrm{LF}}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.9 | 0.47 | 1.7 | 0 | 4.8(7) | 0.21(3) | 29(2) | 9.9(1) | 0.47(1) | 2.6(8) | 0.48 |
| 2.1 | 0.52 | 1.9 | 0 | 4.5(8) | 0.21(3) | 22(1) | 9.0(1) | 0.46(1) | 2.1(8) | 0.50 |
| 2.3 | 0.48 | 2.3 | 0.06(6) | 4.2(13) | 0.22(5) | 17(2) | 8.4(1) | 0.44(4) | 1.7(11) | 0.50 |
| 2.5 | 0.89 | 2.3 | 0.10(11) | 4.0(23) | 0.24(8) | 13(3) | 7.7(1) | 0.42(7) | 1.4(14) | 0.51 |
| 2.7 | 0.81 | 2.8 | 0.19(10) | 4.1(12) | 0.25(4) | 10(2) | 7.1(1) | 0.34(7) | 0.90(46) | 0.57 |
| 2.9 | 0.50 | 2.3 | 0.29(4) | 3.6(4) | 0.21(2) | 9.8(8) | 7.6(1) | 0.27(3) | 0.70(9) | 0.45 |
| 3.1 | 0.58 | 2.3 | 0.23(5) | 3.0(3) | 0.16(1) | 8.7(6) | 6.2(1) | 0.26(3) | 0.54(5) | 0.46 |
| 3.3 | 0.60 | 2.4 | 0.20(7) | 2.5(2) | 0.10(2) | 7.2(4) | 5.8(1) | 0.25(3) | 0.40(3) | 0.41 |
| 3.5 | 0.59 | 2.6 | 0.11(9) | 1.9(3) | 0.03(3) | 6.1(3) | 5.5(1) | 0.29(4) | 0.33(3) | 0.33 |
| 3.7 | 0.54 | 2.5 | 0.13(11) | 2.0(3) | 0.01(2) | 4.6(2) | 5.2(1) | 0.26(3) | 0.21(1) | 0.37 |
| 4.1 | 0.67 | 1.8 | 0.20(2) | 2.1(4) | 0.01(2) | 2.3(1) | 4.7(1) | 0.20(7) | 0.096(9) | 0.42 |
| 4.5 | 0.31 | 1.4 | 0.07(40) | 1.9(5) | 0.01(1) | 1.3(1) | 4.3(1) | 0.18(8) | 0.043(11) | 0.43 |
| 4.9 | 0.26 | 1.4 | 0 | 1.75(6) | 0.01(1) | 0.75(1) | 4.0(1) | 0.19(4) | 0.021(1) | 0.44 |

b) at $B_{\mathrm{DC}}$ = 0.4 with a two-set or three-set Debye model

| $T$/K | $R(\chi')$ /% | $R(\chi'')$ /% | $\chi_S$ | $\chi_{\mathrm{LF}}$ | $\alpha_{\mathrm{LF}}$ | $\tau_{\mathrm{LF}}$ /$10^{-3}$ s | $\chi_{\mathrm{IF}}$ | $\alpha_{\mathrm{IF}}$ | $\tau_{\mathrm{IF}}$ /$10^{-3}$ s | $\chi_{\mathrm{HF}}$ | $\alpha_{\mathrm{HF}}$ | $\tau_{\mathrm{HF}}$ /$10^{-3}$ s |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.9 | 0.48 | 1.5 | 0.08(3) | 4.1(1) | 0.33(1) | 131(4) | | | | 8.9(1) | 0.28(1) | 0.96(2) |
| 2.3 | 0.62 | 2.0 | 0.18(3) | 2.7(1) | 0.32(2) | 126(7) | | | | 7.7(1) | 0.26(1) | 1.00(2) |
| 2.7 | 0.75 | 2.5 | 0.23(3) | 1.8(1) | 0.31(4) | 121(11) | | | | 6.8(1) | 0.23(1) | 0.87(2) |
| 3.1 | 0.44 | 2.2 | 0.23(2) | 1.1(1) | 0.21(4) | 172(11) | | | | 6.0(1) | 0.24(1) | 0.69(1) |
| 3.5 | 0.68 | 3.3 | 0.21(4) | 0.60(7) | 0.02(8) | 250(30) | | | | 5.3(1) | 0.27(1) | 0.49(1) |
| 3.5 | 0.49 | 1.9 | 0.03(18) | 0.70(32) | 0.26(9) | 212(42) | 2.3(21) | 0.05(16) | 1.11(25) | 5.5(1) | 0.27(12) | 0.22(17) |
| 3.9 | 0.48 | 2.0 | 0.48(11) | 0.99(13) | 0.40(8) | 284(61) | 2.7(4) | 0.01(4) | 1.12(10) | 5.0(1) | 0.09(7) | 0.15(1) |
| 4.3 | 0.62 | 2.1 | 0.50(41) | 0.86(47) | 0.50(18) | 387(275) | 2.3(11) | 0.01(8) | 0.82(13) | 4.6(1) | 0.17(21) | 0.095(18) |

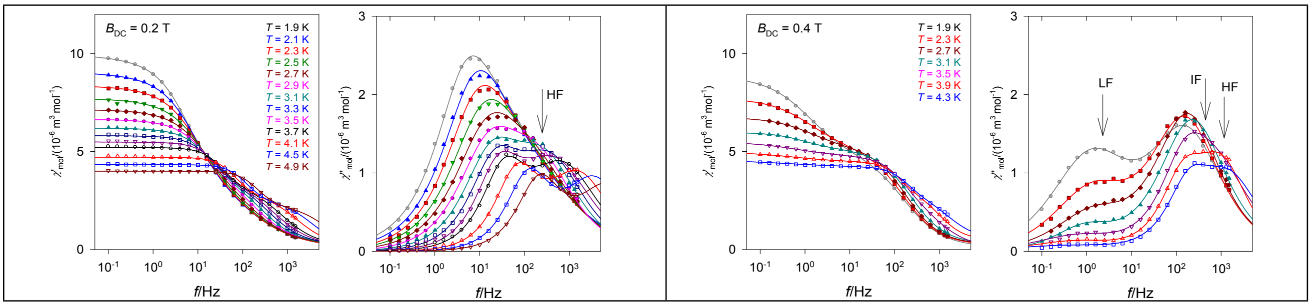


Figure S8. AC susceptibility data for **1**.

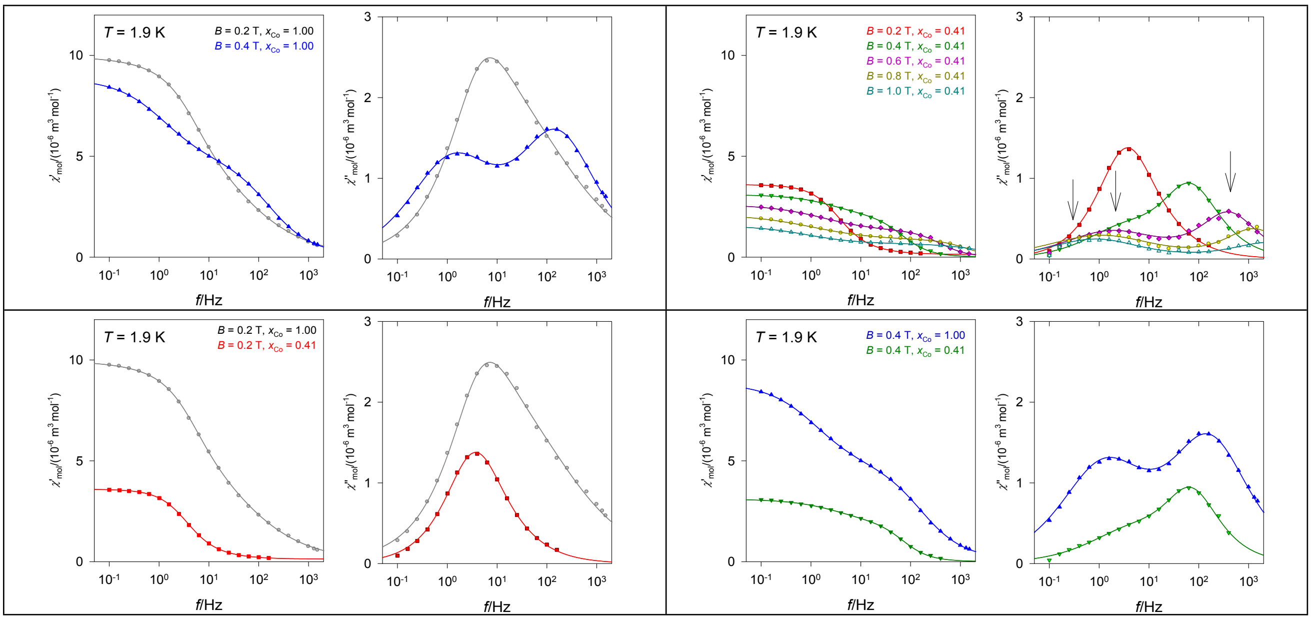
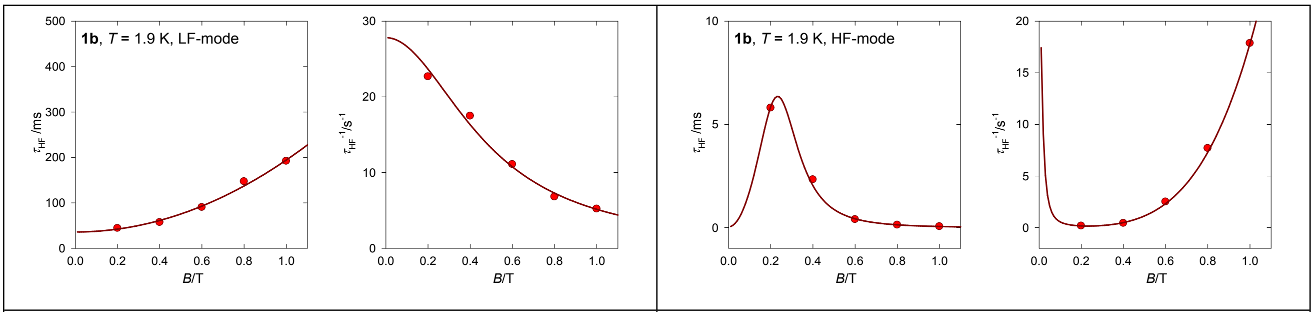


Figure S9. Comparison of the AC susceptibility data for the pure Co and Co:Zn complexes. Lines – fitted. Arrows indicate area of the individual relaxation modes.

Table S6. Results of the fitting procedure for AC susceptibility components of **1** and **1b** at $T$ = 1.9 K. [a]

| Sample | $B$/T | $R(\chi')$ /% | $R(\chi'')$ /% | $\chi_S$ | $\chi_{LF}$ | $\alpha_{LF}$ | $\tau_{LF}$ /$10^{-3}$ s | $f_{LF}$ /s$^{-1}$ | $x_{LF}$ | $\chi_{HF}$ | $\alpha_{HF}$ | $\tau_{HF}$ /$10^{-3}$ s |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1**, gray | 0.2 | 0.5 | 1.7 | 0 | 4.88(69) | 0.21(3) | 29.4(15) | 5.5 | 0.49 | 9.93(3) | 0.47(1) | 2.57(81) |
| **1b**, red | 0.2 | 0.3 | 1.9 | 0.13(3) | 3.37(33) | 0.12(1) | 44.1(21) | 3.6 | 0.93 | 3.60(1) | 0.23(33) | 5.8(89) |
| **1**, blue | 0.4 | 0.5 | 1.5 | 0.08(3) | 4.17(12) | 0.33(1) | 131(4) | 1.2 | 0.47 | 8.87(3) | 0.28(1) | 0.96(2) |
| **1b**, green | 0.4 | 0.8 | 2.7 | 0 | 1.05(9) | 0.29(4) | 57.2(79) | 2.8 | 0.34 | 3.09(2) | 0.12(1) | 2.33(8) |
| **1b**, violet | 0.6 | 1.1 | 6.9 | 0 | 1.33(6) | 0.39(3) | 90.2(67) | 1.8 | 0.51 | 2.60(3) | 0.10(2) | 0.40(1) |
| **1b**, yellow | 0.8 | 1.2 | 15 | 0 | 1.27(8) | 0.45(4) | 147(18) | 1.1 | 0.60 | 2.13(5) | 0.11(5) | 0.13(1) |
| **1b**, **cyan** | 1.0 | 3.0 | 16 | 0 | 0.90(7) | 0.37(5) | 192(25) | 0.83 | 0.58 | 1.56(5) | 0.29(8) | 0.056(8) |

[a] **1b** = $C_{28}H_{24}Co_{0.41}N_6O_{16}Zn_{0.59}$; **1** = $C_{28}H_{24}CoN_6O_{16}$; $f_{LF}$ – frequency when $\chi''$ is maximal, $f_{LF} = 1/(2\pi\tau_{LF})$; susceptibility components in units of $10^{-6}$ m$^3$ mol$^{-1}$ [SI].



| | |
|---|---|
| $\tau^{-1} = D_1/(1 + D_2 B^2)$ :<br>$D_1 = 27.8$ s$^{-1}$, $D_2 = 4.4$ T$^{-2}$ | $\tau^{-1} = D_1/(1 + D_2 B^2) + A_T B^4$ :<br>$D_1 = 2.5 \times 10^4$ s$^{-1}$, $D_2 = 4.4 \times 10^3$ T$^{-2}$, $A_T = 1.8 \times 10^4$ T$^{-4}$ s$^{-1}$ |

Figure S10. Field dependence of the relaxation time for **1b** = $C_{28}H_{24}Co_{0.41}N_6O_{16}Zn_{0.59}$.