Supplementary Materials: Evidence of Slow-Magnetic Relaxation in $Co(AcO)_2(py)_2(H_2O)_2$

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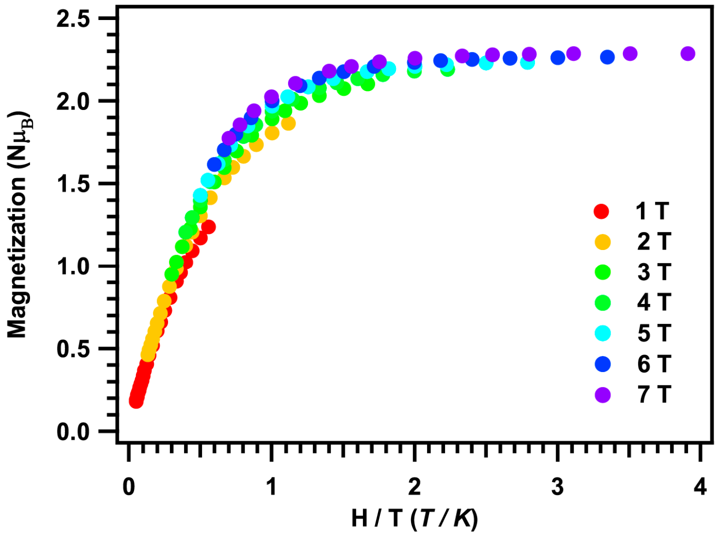

Figure S1. Field-dependent magnetisation data measured for compound **1** at various fields, plotted as the reduced magnetisation.

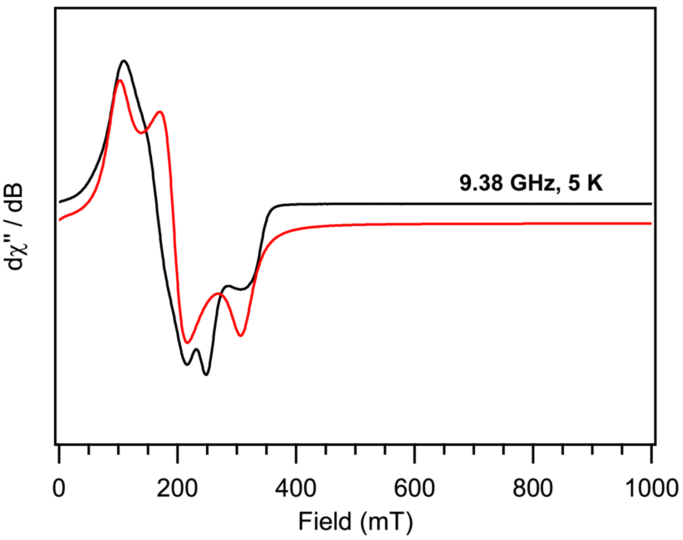

Figure S2. Powder EPR spectra measured for **1**, with simulations plotted in red corresponding to the parameters: $\tilde{S}$ = 1/2, g_x = 2.17, g_y = 3.45, g_z = 6.65.

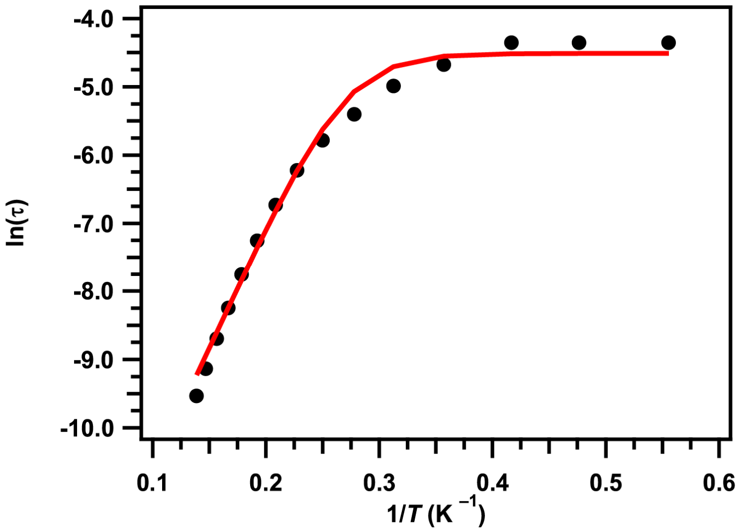

Figure S3. Fit of the Arrhenius plot for compound **1** assuming an Orbach relaxation process and quantum tunnelling, as described in the main text.

Table S1. Calculated free-ion spin-orbit states of Co (II) (S = 3/2).

State	Energy (cm^{-1})
1	0
2	162
3	656

Table S2. Calculated energies and effective *g*-values for the octahedral orbital triplet states.

Kramers Doublet	Energy (cm^{-1})	g_x	g_y	g_z
1	0	2.39	3.28	7.15
2	264	3.76	0.62	2.16
3	514	3.54	1.86	0.89
4	903	0.57	3.38	0.73
5	1208	4.66	0.80	1.21
6	1295	3.56	1.41	1.65

Table S3. Ground Kramers doublet *g*-values from an EPR fit using the T,P isomorphism model, showing excellent agreement with the parameters derived from the effective S' = ½ model.

g_x	g_y	g_z
2.16	3.42	6.63

Generalised Debye models used to fit frequency dependent susceptibilities

$$\chi'(\omega) = \frac{(\chi_S - \chi_T) \times (\omega.\tau)^{1-a} \times \cos(\alpha\pi/2)}{1 + 2(\omega.\tau)^{1-a} \times sin(\alpha\pi/2) + (\omega.\tau)^{2(1-a)}} \tag{S1}$$

$$\chi''(\omega) = \chi_T + \frac{(\chi_S - \chi_T) \times (1 + (\omega.\tau)^{1-a} \times \sin(\alpha\pi/2))}{1 + 2(\omega.\tau)^{1-a} \times sin(\alpha\pi/2) + (\omega.\tau)^{2(1-a)}} \tag{S2}$$