

substance: CoO

property: magnetic properties

magnetic susceptibility: Fig. 1.

effective magnetic moment

p_{eff}	5.25 μ_B	from Curie-Weiss law, for $T > 400$ K	56S
	4.96 μ_B		51H

paramagnetic Curie temperature

Θ_p	– 330 K	56S
	– 280 K	51H

Néel temperature

T_N	292.2 K	susceptibility	51H
	292.2 K	dilatation	48F
	292 K	susceptibility	51T
	295 K	neutron diffraction	68K
	290 K	thermal conductivity	69Z
	290 K	heat capacity	69Z
	289 K	heat capacity	74S
	291 K	Moessbauer effect	66C
	287 K	heat capacity	81K
$d\ln T_N/d\ln V$	≈ -3	(V = unit cell volume)	66C, 66B

The spin structure has been described in two different ways:

1. spins coupled antiferromagnetically between adjacent (111) planes, spins lying in $[\bar{1}\bar{1}7]$ direction at an angle of $11^\circ 30'$ with (001) [58R],
2. spins lie in $(1\bar{1}0)$ plane making an angle of $27.4(5)^\circ$ with (001) and ca. 8° with the (111) plane [65L, 78H].

The second description is now preferred; canting of the spins from the c -axis is due to dipole-dipole forces that partially decouple spin-orbit coupling.

spin-wave spectrum: Figs. 2, 3.

coupling constants of the Hamiltonian

J_1	– 0.08 meV	$T = 110$ K	J_1, J_2 : averaged values	68S
	– 0.47 meV	$T = 4.2...135$ K		72R1
	– 0.26 meV			72R2
J_2	– 1.42 meV	$T = 110$ K		68S
	– 2.36 meV	$T = 4.2...135$ K		72R1
	– 1.52 meV			72R2
	– 1.45 or – 1.8 meV	$T = 9.3$ K		76W

Short-range magnetic order above T_N also reported [72R2].

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Fig. 1.

$\text{Co}_{1-\delta}\text{O}$, powdered crystals. Magnetic susceptibility vs. temperature for two samples: *A*: $\delta = 0.01$. *B*: $\delta = 0.005$ [79S]. χ in CGS-emu. Note: chem. formula in Fig. is wrong.

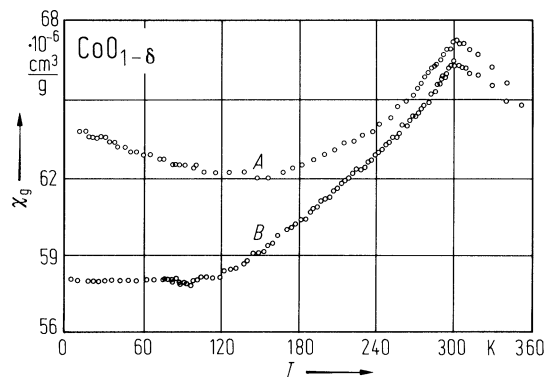


Fig. 2.

CoO. Phonon and magnon dispersion curves at 110 K. Circles represent transverse phonon modes and triangles are longitudinal phonon modes. The solid lines show a best fit shell model. The vertical bars represent broad peaks assigned to magnon dispersion and the dashed lines show a magnon model with next nearest neighbour interaction [68S].

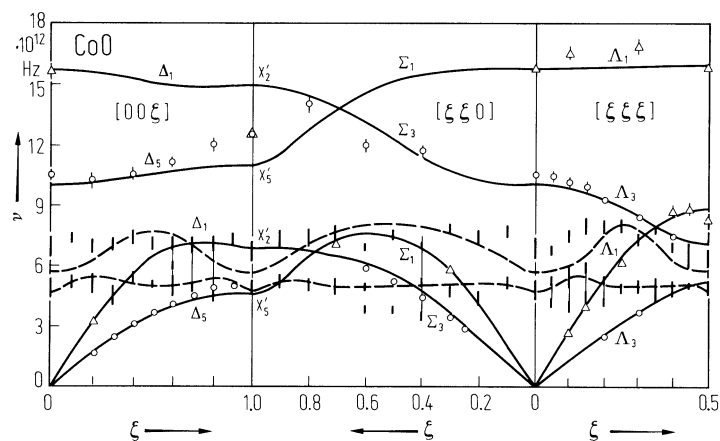


Fig. 3.

CoO. Phonon and magnon dispersion curves at 330 K. Notation as in Fig. 2 for the phonon modes. The magnetic modes have split into the flat curves at 4.8 and $\approx 7.8 \cdot 10^{12}$ Hz [68S].

