



ANASAZI NUCLEI SERIES

MULTINUCLEAR NMR COBALT-59

⁵⁹Co PROPERTIES

- 100% natural abundance
- Spin 7/2, quadrupolar
- Chemical shift range >18000 ppm

DID YOU KNOW?

Your cells rely on cobalt. Vitamin B12, or cobalamin, contains cobalt nuclei and is essential to human life. Modern life also depends on cobalt. It is likely found in your pocket, backpack, and perhaps car as part of the cathode of lithium batteries. The increasing demand for cobalt and difficulties mining in the Democratic Republic of Congo have led to mining expeditions on the deep seabeds of the Pacific Ocean.

The cobalt-59 nuclei also stands alone among all magnetically active nuclei. In fact, cobalt-59 has the largest range of chemical shifts of any nuclei, >18000 ppm or 1.8 %. Cobalt was also one of the first nuclei studied which advanced the theory of chemical shift.

Since the cobalt-59 nuclei is so sensitive to chemical changes, changes to the first and second coordination spheres are readily apparent. Temperature variations and solvent effects also can significantly change the resonance frequency, thus care must be taken of experimental design.

What can you do with ^{59}Co NMR?

Since many cobalt complexes are paramagnetic and because ^{59}Co is quadrupolar, not all cobalt compounds are amenable to NMR studies. However complexes of the diamagnetic Co^{3+} ion that possess a high level of tetrahedral or octahedral symmetry can easily be studied.

^{59}Co PROPERTIES

QUADRUPOLEAR MOMENT:	$0.4 \times 10^{-28} \text{ m}^2$	FREQ EFT-90:	21.357 MHz
RECEPTIVITY TO ^{13}C :	1570	REFERENCE STANDARD:	$\text{K}_3[\text{Co}(\text{CN})_6]$
GYROMAGNETIC RATIO:	10.05 MHzT⁻¹		

R.K. Harris et.al. *Pure Appl. Chem.*, Vol. 73, No. 11, 2001

RECOMMENDED LITERATURE

P. Granger in *Encyclopedia of Nuclear Magnetic Resonance*, John Wiley & Sons, Inc., Chichester, 1996; Vol. 6, 3897–3898.

P. Laszlo in *NMR of Newly Accessible Nuclei*, Academic Press, New York, 1983; Vol. 2, 253–274.