Understanding the Role of Structural Distortion on the Magnetic Behavior of Cobalt Vanadate Kagomé System
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Introduction

Co$_3$V$_2$O$_8$
Orthorhombic crystal structure
Kagomé lattice
Space group: Cmca
Lattice parameters: $a = 6.03(3)$ Å, $b = 8.30(2)$ Å, $c = 11.4(1)$ Å

Application and Motivation

CV curves of Co$_3$V$_2$O$_8$ at various scan rates show redox reactions, making it a potential application for the electrochemical industry.

Synthesis

Pellet formation
Sintering
Quartz tube in ice-bath

Reduction of the effects of geometric frustration in Co$_3$V$_2$O$_8$ results in the appearance of multiple temperature-dependent magnetic phase transitions

Summary and Conclusions

- The relatively large interlayer to intralayer ratio, given as $d_2/d_1 \approx 1.9$, and the indirect interlayer superexchange pathway suggest a strong two-dimensional magnetic character in the compound, with the magnetism dominated by intralayer Co$^{2+}$-O-Co$^{3+}$ coupling interactions.
- The presence of multiple temperature-dependent magnetic phase transitions due to structural distortion is noticed.

References