

Experimental report

29/08/2025

Proposal: 5-25-294

Council: 10/2024

Title: Low Temperature thermal expansion of FeWO₄

Research area: Materials

This proposal is a new proposal

Main proposer: Javier GONZALEZ PLATAS

Experimental team: Javier GONZALEZ PLATAS

Local contacts: Laura CANADILLAS DELGADO
Oscar Ramon FABELLO ROSA

Samples: FeWO₄

Instrument	Requested days	Allocated days	From	To
D20	1	1	25/06/2025	26/06/2025
XTREMED	1	0		

Abstract:

The wolframite-type FeWO₄ crystallize in a monoclinic crystal structure at room temperature (P2/c), displays antiferromagnetic behaviour with a Néel temperature (TN) of 75 K under ambient pressure, attributed to superexchange interactions between Fe ions. In our study about the influence of pressure on the magnetism behaviour we have found some discrepancies in the compressibility of this compound both at room temperature and at low temperatures with respect to measurements made by X-rays diffractions and in trend indicated by calculations made in DFT. In order to clarify these discrepancies we need to know the evolution of the cell parameters and their main geometric parameters with temperature (30-300K), studies that have not been published to date. We request a beam day in D20 at high resolution setup for this purpose.

Experimental Report

ID Experiment:	5_25_294
Title:	Low Temperature Thermal expansion of FeWO ₄
Instrument:	D20
Local contact:	Canadillas Delgado, Laura Fabelo Rosa, Oscar Ramon
Main Proposer:	Javier Gonzalez Platas
Home Institution:	Universidad de La Laguna. Departamento de Física
Visit days:	25/06/2025
Report submission Date:	29/08/2025

Abstract

The wolframite-type FeWO₄ crystallizes in a monoclinic crystal structure at room temperature (P2/c), displays antiferromagnetic behavior with a Neel temperature (T_N) of 75 K attributed to superexchange interactions between Fe ions.]. In our current study, we are evaluating the behavior of the cell parameters with temperature from 2K to 500K in order to determine the thermal expansion for this compound.

Aims

Our aims were to:

- Investigate the evolution of the cell parameters of FeWO₄ from 2K to 500K
- Determine the thermal expansion coefficient

Achievements / Experimental Report

We should note that there were no relevant incidents regarding the experimental process carried out in D20 on the assigned day.

A preliminary analysis of the results shows certain discrepancies that need to be resolved. On the one hand, we have detected a significant variation in the Neel temperature (T_N) during the lowering process compared to the heating process, which requires further verification. To this end, we have submitted an additional request as an Easy Proposal.

On the other hand, there is a discrepancy between the data obtained in this experiment (synthesized powder sample) and single-crystal X-ray diffraction data (natural sample).

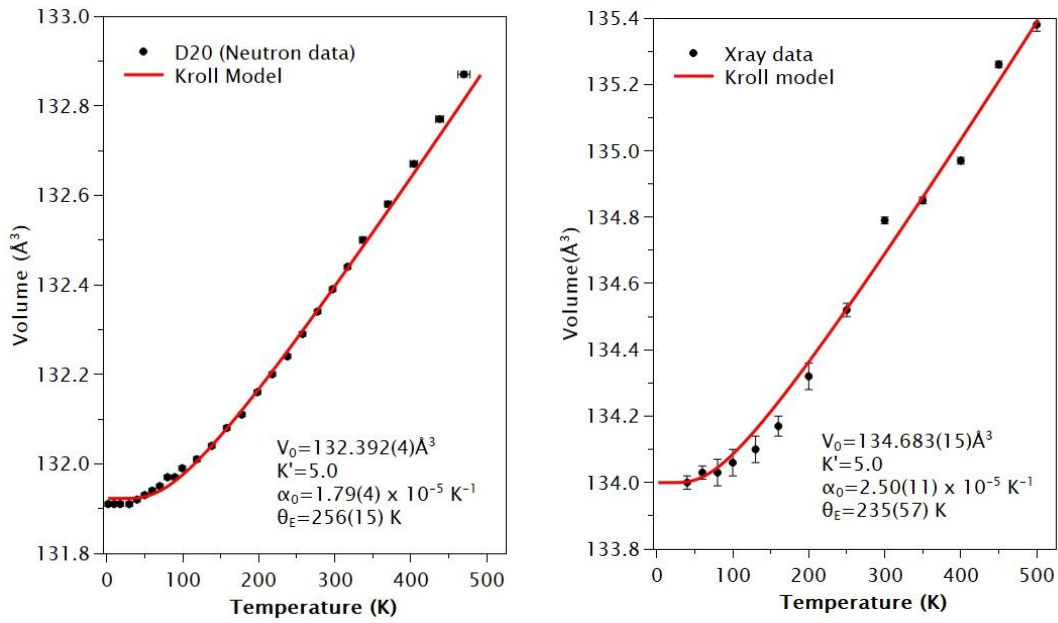


Figure: Evolution of volume with temperature for FeWO_4 measured in D20 (left) and in Bruker D8 Advance (right).

We believe that this difference is due to the nature of the samples used in both experiments and to ensure this assumption we will soon measure the synthesized sample in X-ray powder diffraction.

Potential publications

Once the studies planned for this compound are completed using additional measurements, we hope to be able to publish this entire study in a high-impact journal.