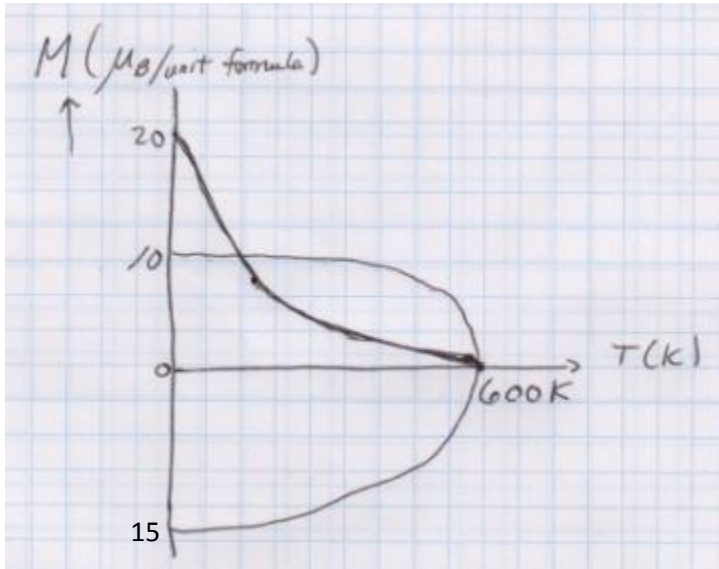


#12: Magnetics Question

- 1) (1 pt) Iron garnets ($X_3\text{Fe}_2\text{Fe}_3\text{O}_{12}$) are known for their excellent high frequency susceptibility. Why?

- 2) (2 pt) Rare-earth ($\text{RE}_x\text{Fe}_2\text{Fe}_3\text{O}_{12}$) iron garnets have compensation temperatures at which their net magnetization is zero, and these compensation temperatures are below the Curie temperature. The cations (in order shown) are in three types of sublattices: dodecahedral, octahedral, and tetrahedral. Below is a graph of the magnetizations of each sublattice vs T.
 - a. Identify which sublattice is which.
 - b. Identify the Curie temperature
 - c. Find the compensation temperature.
 - d. Explain why the shapes of each sublattice curve.

(M in μ_B /unit formula)



(T in Kelvin)

- 3) (1 pt) The anisotropy constants of garnet are:
 - $K_1 = -3.95 \text{ kerg/cm}^3$
 - $K_2 = -3.0 \text{ kerg/cm}^3$
 Draw a polar plot of the crystal anisotropy E as a function of direction in the (001) plane of garnet.

