Chapter 4. PROBLEMS

4.1. Magnetic moments in ferrites.

a) Give the outer electron configurations and magnetic moments for the following ions: Fe^{2+}, Fe^{3+}, Mn^{2+}, and Zn^{2+}

b) Using the site selection shown in Fig. 4.15, determine the preferred site occupations for Mn and Fe in $MnFe_2O_4$ (assume Mn^{2+}) and give its magnetic moment per formula unit.

c) Describe what happens to the site occupation and net moment as Zn^{2+} is first substituted for Mn^{2+}.

4.2. Explain what happens as Zn substitutes for Ni in nickel ferrite, $NiFe_2O_4$. Again, describe the valence electronic structure of the ions and magnetic moment variation per formula unit. Be quantitative where possible.

4.3 Use the data for paramagnetic Ni in Fig. 3.5 to calculate the molecular field coefficient λ in $H^{eff} = \lambda M$ in the following two ways:

a) Calculate the Curie constant from Eq. 4.21 using a lattice constant of 3.6Å for fcc Ni.

b) Determine the Curie constant then λ from two data points on $\chi(T)$ Fig. 4.8.