substituted YFe garnet system. The agreement between the tw methods is quite good, but is actually even better than it looks i we take the 0 °K moments that the other authors obtained for thei specimens (see Ref.[27]).

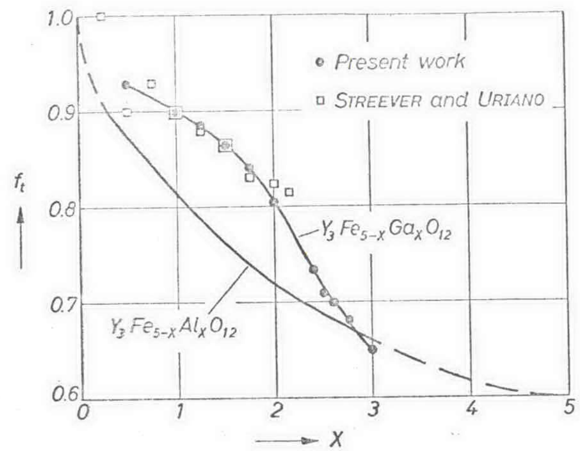

Fig. 6. Fraction, f_t, of Ga^{3+} and Al^{3+} ions in tetrahedral sites in $Y_3Fe_{5-x}Ga_xO$ and $Y_3Fe_{5-x}Al_xO_{12}$, respectively (from Ref.[27])

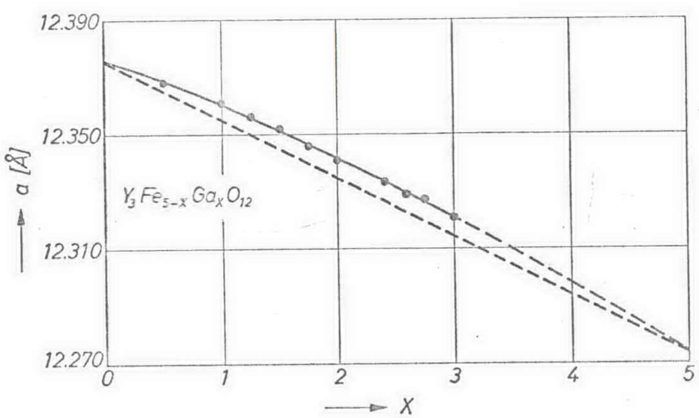

Fig. 7. Lattice constant vs x (from Ref.[27])

For $x > 1.50$, the distribution appears to be sensitive to specim heat treatment and this may be part of the reason for different 0° moments obtained by different investigators. The importance of ca in specimen preparation cannot be overestimated. In many system the lattice-constant measurements can give an indication of t

specimen quality. Smooth curves should be obtained for lattice constant and moment, at a fixed temperature, vs composition. Examples from the $Y_3Fe_{5-x}Ga_xO_{12}$ system are given in Figs. 7 and 8.

Fig. 6 shows that for most of the composition range the Ga^{3+} ions have a greater preference for tetrahedral sites (f_t = fraction of Ga^{3+} or Al^{3+} ions in tetrahedral sites) than Al^{3+} ions to $x \approx 2.75$. For $x > 2.75$, the curves may coincide or cross. Unfortunately, we cannot

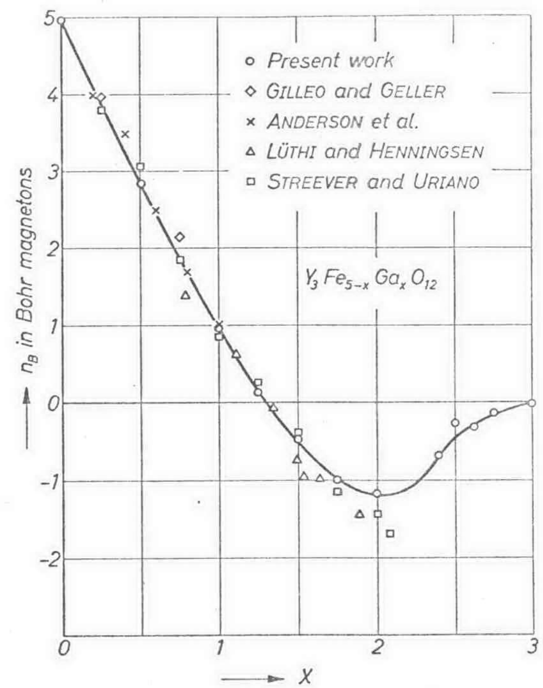

Fig. 8. Spontaneous moment at 0°K vs x (from Ref.[27]). (See Ref.[27] for pertinent references)

learn from static magnetic measurements anything about ionic distributions in specimens with x greater than 3.00. Furthermore, it is unlikely that the accuracy desired is attainable by diffraction techniques.

In regard to the diffraction techniques, a paper by FISCHER *et al.*[101] purports to give the distributions in the systems by both x-ray and

[101] P. FISCHER, W. HÄLG, E. STOLL and A. SEGMÜLLER, X-ray and neutron diffraction study of substitutional disorder in yttrium-iron-gallium garnets. Acta Crystallogr. 21 (1966) 765–769.