Group II*B*

8. Zn^{2+}: *a* sites and possibly *c* sites

$\{Gd_3\}[Zn_2](GaGe_2)O_{12}$ [43] $a = 12.464$ Å
$\{MnGd_2\}[ZnMn](Ge_3)O_{12}$ [45] (probable distribution) 12.427
$\{NaCa_2\}[Zn_2](V_3)O_{12}$ [74] 12.439

See also 1.

9. Cd^{2+}: *c* sites

$\{CdGd_2\}[Mn_2](Ge_3)O_{12}$ [43] $a = 12.473$ Å

See also Tables 3 and 4.

Group III*B*

10. Sc^{3+}: *a* sites

Examples of end-member garnets containing Sc^{3+} ions are given in Tables 3 and 4. However, the earliest published report of substitution of Sc^{3+} ion in the iron garnets is given in Ref. [78]. Some systems studied involving Sc^{3+} ion are:

$\{Y_3\}[Fe_{2-x}Sc_x](Fe_3)O_{12}$ [7,59,78]
$\{Gd_3\}[Fe_{2-x}Sc_x](Fe_3)O_{12}$ [75]
$\{Y_{3-y}Ca_y\}[Sc_xFe_{2-x}](Si_yFe_{3-y})O_{12}$ [7]
$\{Gd_2Y\}[Fe_{2-x}Sc_x](Fe_3)O_{12}$ [75]

11. Y^{3+}: *c* and *a* sites

See Tables 4 and 5 and the various other examples given in this survey. Also see previous discussion of solid solutions in the Y_2O_3—Ga_2O_3 and Y_2O_3—Al_2O_3 systems.

12. Rare earths: all the trivalent rare-earth ions except that of Pm are *known* to enter *c* sites in the garnets. Pm^{3+} should also, but as far as I know the rarity of Pm has precluded its being tried. Replacement of at least 1% of the yttrium by Ce^{3+} in YFe garnet has been recently proved[79]. (Actually, it should be possible to replace 30% of the Y^{3+} by Ce^{3+} ion.) The smaller trivalent ions of Lu, Yb, Tm, Er, Ho, and Dy also enter *a* sites as shown in Table 4. Substitution of Yb^{3+} (in small amount) for Fe^{3+} in YFe garnet has been indicated by microwave resonance absorption measurement[80]. Various mixed rare earth iron garnet systems have also been studied.

[78] M. A. GILLEO and S. GELLER, Substitution for iron in yttrium iron garnet. J. Appl. Physics 29 (1958) 380—381.

[79] K. A. WICKERSHEIM and R. A. BUCHANAN, Optical studies of exchange in substituted garnets. J. Appl. Physics 38 (1967) 1048—1049.

Group III*A*

13. Al^{3+}: *a* and *d* sites

Many examples of end-member garnets containing Al^{3+} ion are given in Tables 3—5. In addition, several solid-solution systems including the Al^{3+} ion have been studied; some examples are:

$\{Y_3\}Fe_{5-x}Al_xO_{12}$ [7,59,78]
$\{Gd_3\}Fe_{5-x}Al_xO_{12}$ [75]
$Ca_3Al_2Si_3O_{12}$—$Y_3Fe_2Fe_3O_{12}$ [36]
$Mn_3Al_2Si_3O_{12}$—$Y_3Al_2Al_3O_{12}$ [40]
$Mn_3Al_2Si_3O_{12}$—$Y_3Fe_2Fe_3O_{12}$ [36]
$\{Bi_{0.25}Y_{2.75}\}Fe_{5-x}Al_xO_{12}$ [81].

14. Ga^{3+}: *a* and *d* sites

Many examples are given in Tables 3—5 and elsewhere in this survey. One of the most extensively studied systems is $Y_3Fe_{5-x}Ga_xO_{12}$ [27], a detailed discussion of which will be given elsewhere in this paper.

15. In^{3+}: *a* sites

The first introduction of In^{3+} ion into YFe garnet was reported in 1958[78]. Examples of complete *a* site occupation are given in Tables 3 and 4. There is a possibility that In^{3+} ions will enter *c* sites.

Group IV*B*

16. Ti^{4+}: prefers *a* sites but enters *d* sites

$\{Ca_3\}[TiNi](Ge_3)O_{12}$ $a = 12.341$ [74], 12.32 [43] Å
$\{Ca_3\}[TiCo](Ge_3)O_{12}$ 12.356 [74], 12.35 [43]
$\{Y_{3-x}Ca_x\}Ti_xFe_{5-x}O_{12}$ [66,82]

[80] J. F. DILLON, JR., J. P. REMEIKA and L. R. WALKER, Yb^{3+} on octahedral sites in YIG. Bull. Amer. Physic. Soc. [2] 11 (1966) 378.

[81] S. GELLER, H. J. WILLIAMS, R. C. SHERWOOD and G. P. ESPINOSA, Bismuth substitution in yttrium iron aluminum garnets. J. Appl. Physics 35 (1964) 1754—1756.

[82] S. GELLER, R. C. SHERWOOD, G. P. ESPINOSA and H. J. WILLIAMS, Substitution of Ti^{4+}, Cr^{3+} and Ru^{4+} ions in yttrium iron garnet. J. Appl. Physics 36 (1965) 321.