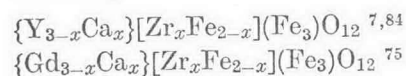


See also 4, 23, 24.

17.  $Zr^{4+}$ :  $a$  and  $c$  sites

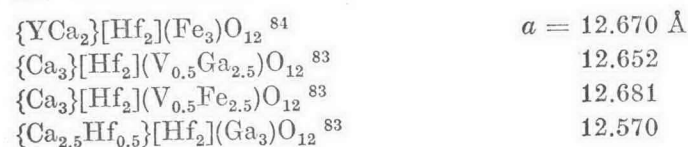


(In this case, our powder photograph had some faint extra lines, indicating that the formula of the garnet is not precisely as written.)



See also 4, 23, 24, 33a, 35.

18.  $Hf^{4+}$ :  $a$  and  $c$  sites



See also 23 and 24.

Group IV A

19.  $Si^{4+}$ :  $d$  sites only

Many examples are given in Table 3 and elsewhere in this survey. Comments under  $Si^{4+}$  in the earlier survey<sup>8</sup> have been corrected.

20.  $Ge^{4+}$ : prefers  $d$  sites but will enter  $a$  sites

Many examples are given in Table 4 and elsewhere in this survey. Comments under  $Ge^{4+}$  in the earlier survey<sup>8</sup> have been corrected. See also Refs. 7 and 97.

<sup>83</sup> B. V. MILL', G. M. ZADNEPROVSKII and V. V. BAKAKIN, New compounds with garnet-type structure. *Izv. Akad. Nauk SSSR, Neorg. Mater.* 2 (1960) 1861–1864.

<sup>84</sup> S. GELLER, R. M. BOZORTH, C. E. MILLER and D. D. DAVIS, Crystal chemical and magnetic studies of garnet systems  $\{YCa_2\}[M_2^{4+}](Fe_3)O_{12}-\{Y_3\}[Fe_2](Fe_3)O_{12}$ ;  $M = Zr$  or  $Hf$ . *J. Physics Chem. Solids* 13 (1960) 28–32.

21.  $Sn^{4+}$ : prefers  $a$  sites but enters  $d$  sites

In the earlier survey<sup>8</sup>, we gave as an example the distribution of  $Sn^{4+}$  ion in  $Ca_3Fe_2Sn_3O_{12}$ . In our first paper on the tin-substituted yttrium iron garnets, we indicated that we did not obtain a single-phase garnet with this composition. In later work<sup>85</sup>, we were still unable to do so and we believe tentatively that defect structures are indicated. In addition to our studies<sup>77,85</sup> of the system,  $\{Y_{3-x}Ca_x\}Fe_{5-x}Sn_xO_{12}$ , some studies<sup>86</sup> have been made on the analogous Gd system; lattice constants are not reported, however. Other Sn-containing garnets reported are:



(In this case, our powder photographs contained some faint unidentifiable extra lines, indicating that the formula of this garnet is not precisely as written.)

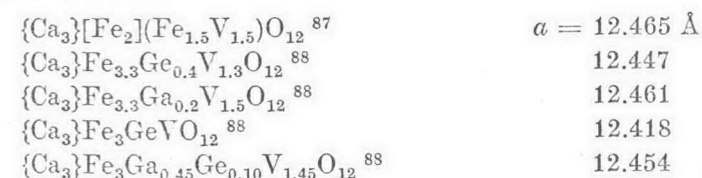
See also 6, 23, 24.

Group V B

22a.  $V^{3+}$ :  $a$  sites only (probably)

See Tables 3 and 4.

b.  $V^{5+}$ :  $d$  sites



<sup>85</sup> S. GELLER, H. J. WILLIAMS, R. C. SHERWOOD and G. P. ESPINOSA, On the tin-substituted yttrium iron garnets. *J. Physics Chem. Solids* 26 (1965) 443–445.

<sup>86</sup> K. P. BELOV and I. C. LYUBUTIN, Magnetic properties of the substituted garnet ferrites of gadolinium and yttrium. *Kristallografiya* 10 (1965) 351–356; *Soviet Physics—Crystallography* 10 (1966) 282–286.

<sup>87</sup> S. GELLER, G. P. ESPINOSA, H. J. WILLIAMS, R. C. SHERWOOD and E. A. NESBITT, Rare-earth and yttrium-free ferrimagnetic garnet with 493°K Curie temperature. *Appl. Physics Letters* 3 (1963) 60–61.

<sup>88</sup> S. GELLER, G. P. ESPINOSA, R. C. SHERWOOD and H. J. WILLIAMS, Additional yttrium-free ferrimagnetic garnets. *J. Appl. Physics* 36 (1965) 321–322.