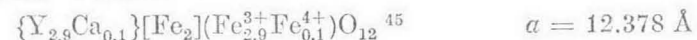
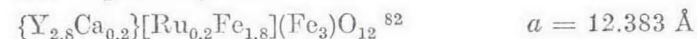
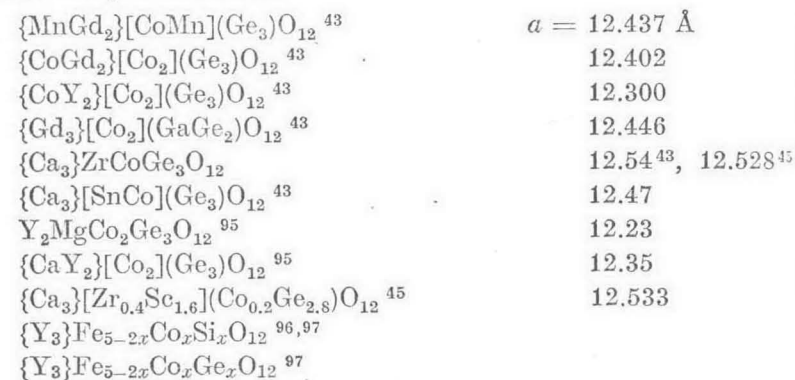


b. Fe³⁺: *a* and *d* sites

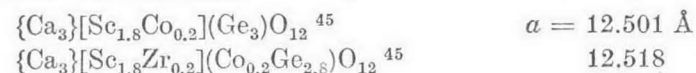
See the numerous examples in Tables 3–5 and throughout the survey.

c. Fe⁴⁺: *d* sites⁹⁴

Magnetic measurements have not as yet been made on the material. The formula is written in accord with the Tchernev paper.

32. Ru⁴⁺: probably *a* sites33a. Co²⁺: *c*, *a* and *d* sites

See also 1, 16, Table 3, and discussion section on ionic-site preference.

b. Co³⁺ *a* and *d* sites

⁹⁴ D. I. TCHERNEV, Frequency-dependent anisotropy in Si- and Co-doped YIG and LuIG. *J. Appl. Physics* **37** (1966) 1318–1320. See also D. L. WOOD and J. P. REMEKA, Optical transparency of rare-earth iron garnets. *J. Appl. Physics* **37** (1966) 1232–1233.

⁹⁵ D. REINEN, Die Lichtabsorption des Co²⁺ und Ni²⁺ in oxidischen Ferrkörpern mit Granatstruktur I. *Z. anorg. allg. Chem.* **327** (1964) 238–252.

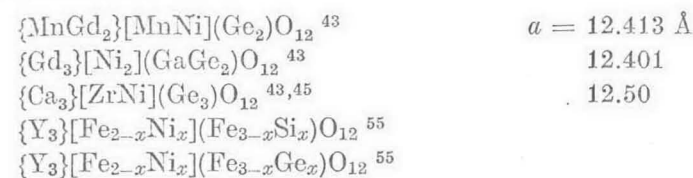
⁹⁶ S. GELLER, H. J. WILLIAMS, R. C. SHERWOOD and G. P. ESPINOSA, Substitutions of divalent transition metal ions in yttrium iron garnet. *J. Appl. Physics* **33** (1962) 1195–1196.

⁹⁷ S. GELLER, H. J. WILLIAMS, G. P. ESPINOSA and R. C. SHERWOOD, Substitution of divalent cobalt in yttrium iron garnet. *Physic. Rev.* **136** (1964) A1650–A1656.

After calcining these specimens for half an hour at 1215°C in oxygen, the first was fired at 1200°C for 24 hours in O₂ then quenched. The second was fired at 1220°C for 2 hours in O₂, then reground, recompact and refired at 1225°C for 16 hours in O₂. The first specimen, i.e. with the Co³⁺ ions presumably in octahedral sites is canary yellow; the second is yellow-green.

34. Rh³⁺: *a* sites

See Table 4 for end-members.

35. Ni²⁺: *a* sites

See also 1 and 16.

Note: Wherever a system is given in the above survey, lattice constants for various compositions are given in the references.

Ionic site preference

In our earlier work on the garnets, it appeared that the octahedral and tetrahedral sites preferred cations with spherical or pseudospherical ground-state electronic configurations. I should emphasize that we did not assert this rule; rather we indicated that experiments designed to synthesize garnets with ions not satisfying this rule were unsuccessful. However, even though we were aware of the paper (see Ref.⁸), we somehow missed the synthesis by DURIF⁷⁴ of the garnet $\{NaCa_2\}[Cu_2](V_3)O_{12}$ in 1958. This alone would be enough to negate this rule because the Cu²⁺ ion has one of the largest Jahn-Teller distortions. But subsequently⁵⁵ we managed to replace a small amount of Fe³⁺ by Mn³⁺ ion in YFe garnet. Because it was only about 2%, replacement, we could not be *absolutely* sure of it, even though the powder photograph indicated a single-phase material and the moment per formula unit was significantly higher than that of pure YFe garnet as it should have been.

More recently, garnets in which Mn³⁺ ions fill the *a* sites have been synthesized⁴⁷. The Mn³⁺ ion, of course, is the other 3*d* ion with a very large Jahn-Teller distortion. Further, a silicate garnet (goldmanite)