molecules in the beryl channels. On the other hand, assuming that a detailed identification of absorption bands can eventually be made, the infrared spectrum of beryl should be useful to the mineralogist in the identification of impurities and in the determination of their concentrations.

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THE SYNTHESIS OF UVAROVITE

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As part of another investigation, we recently attempted the preparation of the garnet $Ca_3Cr_2(SiO_4)_3$. The direct synthesis of this garnet has been reported by Hummel (1) whose results we have corroborated only in part.

The largest amount of garnet phase was produced by heating the pressed mixture of reactants ($3CaO+Cr_2O_3+3SiO_2$) at 1400° C. for 2 hrs. The extra phases present were α-$CaSiO_3$ and Cr_2O_3. Three samples heated at 1200° C. for 47, 125 and 192 hrs. gave only very small amounts of garnet phase and large amounts of the α-$CaSiO_3$ and Cr_2O_3.

The powder data for the garnet phase are given in Table 1. The lattice constant of the synthetic uvarovite is 12.00 ± 0.02 Å.

Menzer (2) has reported a lattice constant of 11.974 ± 0.003 Å for an uvarovite specimen from Sysmä, Finland. The chemical analysis of this sample indicated the presence of 1.93% Al_2O_3, 0.41% Fe_2O_3 and 0.50% MgO impurities. A sample from Bissersk in the Urals reported by Menzer had a lattice constant of 11.969 ± 0.013 Å but larger amounts of Al_2O_3 (5.8%) and MgO (~1.3%). This sample also had larger amounts of iron, probably 2.0% in terms of Fe_2O_3, than did the sample from Finland.

We have obtained two samples of natural uvarovite of which the lattice constants have been measured but no chemical analyses made. One, obtained from Ward's Natural Science Establishment, originally found in Orford, Quebec, was crystallized on tremolite. The crystals were

TABLE 1. POWDER DATA FOR SYNTHETIC UVAROVITE (CrKα RADIATION)

hkl	d_{obs}	d_{calc}	I
321	3.21	3.21	w
400	3.00	3.00	m-s
420	2.68	2.68	s
332	2.56	2.56	vw
422	2.45	2.45	m
431	2.35	2.35	w
521	2.19	2.19	w
611, 532	1.95	1.95	w-m
620	1.90	1.90	vw
444	1.731	1.732	vw
640	1.663	1.664	m
642	1.602	1.604	m-s
800	1.499	1.500	w
840	1.341	1.342	w-m
842	1.309	1.309	m
565, 921, 761	1.294	1.294	w
664	1:279	1.279	w-m

very small and included an impurity phase. The other sample* from Outokumpu, Finland, was obtained from Dr. G. Switzer of the Smithsonian Institute. Both samples have the same lattice constant, 11.931 $\pm$0.005 Å, within experimental error. This value is significantly smaller than that of the synthetic; presumably there are substantial amounts of Al^{3+} and possibly Fe^{2+} and/or Mg^{2+} ions in these samples.

Recently, Gillery (3) reported the lattice constant 11.87 Å for an uvarovite specimen from Orford, Quebec. However, that specimen contained 36.7% SiO_2, 33.2% CaO, 17.5% Al_2O_3, 6.2% Cr_2O_3, 5.0% FeO, 0.81% MgO. Thus, for Gillery's sample, a lattice constant much closer to that of grossularite, $Ca_3Al_2(SiO_4)_3$ should be expected; for a pure synthetic grossularite, the lattice constant is 11.851 Å (4)

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* Smithsonian sample designation No. 1C6829.