

(2). gallium garnets and Ga_2O_3 (7), and for this reason was chosen as a flux for the orthoaluminates. Sample volumes of approximately 0.054 cc. each were packed into separate platinum containers. During all runs, two materials were pressed simultaneously at 32.5 kilobars and $1200^\circ \pm 10^\circ\text{C}$, for a period of four hours. After quenching, the apparatus was allowed to cool over night, the pressure released, and the subsequent recovery of the sample containers effected. Each platinum cell was then broken open and immersed in distilled water. The NaOH rapidly dissolved leaving small, rectangular parallelepiped-shaped, transparent crystals. The crystals of the Ho, Er, and Tm compounds were colored pale yellow, pale pink, and pale green respectively, while those of Dy, Yb and Lu aluminate were colorless. All the crystals were strongly birefringent.

X-ray powder films were taken of Eu-LuAlO_3 crushed crystals with a Guinier camera using KCl as internal standard and $\text{CuK}\alpha$ radiation ($\text{K}\alpha_1 = 1.5405 \text{ \AA}$ and $\text{K}\alpha_2 = 1.5443 \text{ \AA}$). None of the powder films showed any trace of garnet lines after 24 hrs. exposure. They were all indexed on the basis of the orthorhombic cell, space group Pbnm, with lattice constants given in Table 1.

TABLE 1

Orthorhombic Cell Data for the Series $\text{SmAlO}_3\text{-LuAlO}_3$. The standard deviations are less than 10^{-4} , except for those of EuAlO_3 and GdAlO_3 which are twice as large.

	$\underline{a, (\text{\AA})}$	$\underline{b, (\text{\AA})}$	$\underline{c, (\text{\AA})}$	$\underline{\text{Vol. \AA}^3}$
SmAlO_3	5.2912	5.2904	7.4740	209.22
EuAlO_3	5.267	5.294	7.459	208.0
GdAlO_3	5.250	5.302	7.447	207.3
TbAlO_3	5.2317	5.3097	7.4196	206.11
DyAlO_3	5.2053	5.3172	7.3950	204.68
HoAlO_3	5.1811	5.3229	7.3741	203.37
ErAlO_3	5.1595	5.3271	7.3539	202.12
TmAlO_3	5.1435	5.3277	7.3335	200.96
YbAlO_3	5.1251	5.3310	7.3146	199.85
LuAlO_3	5.1012	5.3317	7.3000	198.55

2:1. The lattice parameters were refined from values of 2θ which were $\leq 2\theta(224)$, excluding overlapped lines. The lattice parameters for SmAlO_3 were determined by a simplified version