

TABLE 1

TG data, final residues (%)

Residue	Theor.	Exp.	Residue	Theor.	Exp.
CeO <sub>2</sub>	16.25	16.2	Ho <sub>2</sub> O <sub>3</sub>	17.43	19.8
Nd <sub>2</sub> O <sub>3</sub>	15.84	18.1	Er <sub>2</sub> O <sub>3</sub>	17.61	20.5
Sm <sub>2</sub> O <sub>3</sub>	16.30	20.7	Tm <sub>2</sub> O <sub>3</sub>	17.74	16.4
Eu <sub>2</sub> O <sub>3</sub>	16.43	18.7	Yb <sub>2</sub> O <sub>3</sub>	18.05	19.3
Gd <sub>2</sub> O <sub>3</sub>	16.84	17.7	Lu <sub>2</sub> O <sub>3</sub>	18.19	14.2
Tb <sub>4</sub> O <sub>7</sub>	17.35	18.1	Y <sub>2</sub> O <sub>3</sub>	12.44	14.3

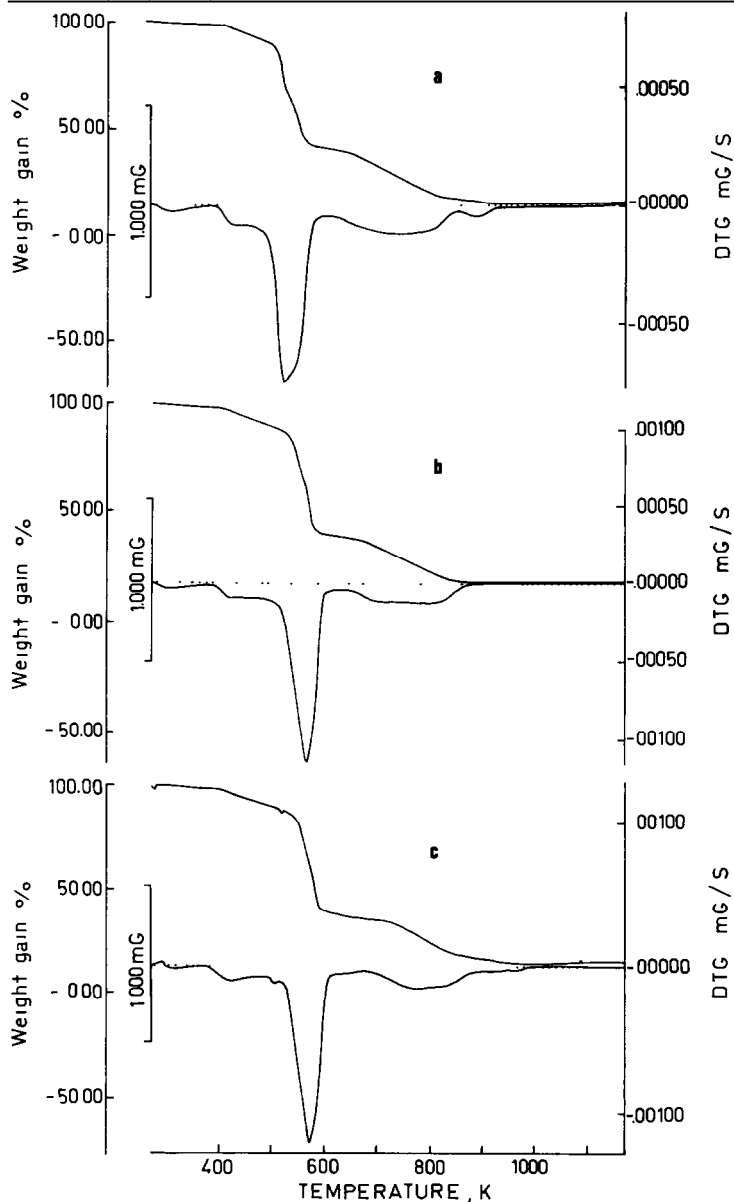


Fig. 1. TG and DTG curves: (a) cerium, (b) europium, and (c) yttrium complexes.

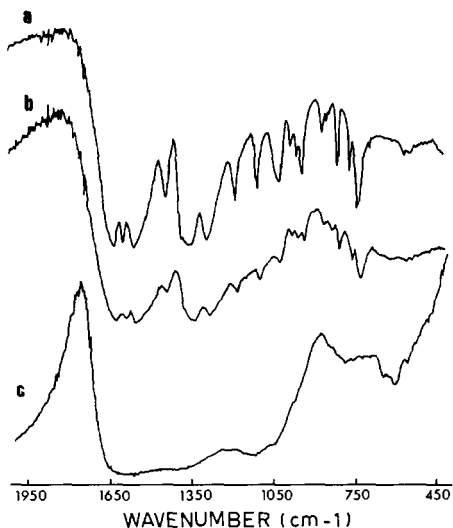


Fig. 2. IR spectra of the residues obtained at cure (curve a) 543, (curve b) 553, and (curve c) 603 K.

## RESULTS AND DISCUSSION

The compounds are slightly hygroscopic. Due to this property they contain small amounts of water (less than 1%) that are lost up to  $\approx 430$  K.

The TG curves are all very similar. The elimination of DMSO occurs in two steps between  $\approx 430$  and 560 K. At about 570 K, there is a poorly defined inflexion that may correspond to the composition  $\text{LnO}(\text{pic})_4$ . After that ( $\approx 610$  K), the residues correspond to a mixture of carbon, lanthanide nitrates and a small amount of remaining organic material (C = 29.2%, N = 11.5%). The presence of nitrate was demonstrated by the characteristic test with Fe(II) in concentrated sulfuric acid. From  $\approx 680$  K up to  $\approx 970$  K, oxidation of the carbon by the nitrate occurs with evolution of  $\text{CO}_2$  and formation of  $\text{Ln}_2\text{O}_3$  (Nd, Sm—Gd, Ho—Lu, Y),  $\text{CeO}_2$  and  $\text{Tb}_4\text{O}_7$ . The residue, in most cases, still contains small amounts of carbon and is of higher mass than theoretically expected (Table 1). It is important to mention that in some cases explosions occurred at about 580 K. Figure 1 shows typical TG curves for three representative complexes (Ce, Eu, Y) and Fig. 2 shows IR spectra of the residues obtained at several temperatures.

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