In a recent discussion of the interatomic distances in $ThPd_3$ and $ThPd_4$, both of which have a range of composition of a few per cent (Thomson, 1962*a*), it was pointed out that the closest Th–Pd distance increased with increasing thorium composition and, as shown in Table 2, this trend is continued in the neighbouring compound Th_3Pd_5. The Th–Th and Pd–Pd distances do not follow any trend. Given that the atomic radii (for C.N. 12) in the pure metals are 1·37 and 1·80 Å for palladium and thorium respectively, there is a considerable contraction in the Th–Pd distance in all three compounds.

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Preliminary X-ray study on the dioxane addition compounds of hydrated rare earth perchlorates.

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Dioxane addition compounds of hydrated rare-earth perchlorates have been prepared for the first time by Vicentini, Perrier & Giesbrecht (1961), and their crystallographic properties are now described in this paper. Their general chemical formula is $M(ClO_4)_3 . 9\,H_2O . 4\,C_4H_8O_2$, with M = La, Ce, Pr, Nd, Sm. The five compounds form an isomorphous series.

The substances are usually both powdery and very hygroscopic, and so no good crystals were available for use of X-ray single-crystal techniques. Attempts to grow thicker specimens were ineffective.

Under the microscope, the crystals are biaxial with parallel extinction. The $2V$ angles were measured with the universal stage and the indices of refraction were determined with the petrographic microscope by the immersion method. The figures in Table 1 are only approximate, on account of the unstable character of the substances.

The unit-cell dimensions (Table 2) were computed by Ito's procedure (1950), applied to powder photographs obtained in a 114·6 mm Buerger powder camera. The assignment of indices (Table 3) corroborated the orthorhombic system, already suspected from the optical data.

The pycnometer method was used for determination of densities, with dioxane as the immersion liquid. Random errors may occur in the second decimal place, due to the probable absorption of dioxane while the density determinations were carried out.

The number of formulas per unit cell is approximately 6. No systematic absences were observed, and thus three alternative space groups are possible: *Pmmm*, *P2mm* and *P*222.

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Table 1. *Optical constants*

	La-compound	Ce-compound	Pr-compound	Nd-compound	Sm-compound
N_X (obs.)	1·454	1·455	1·453	1·458	1·460
N_Y (obs.)	1·457	1·458	1·456	1·461	1·464
N_Z (calc.)	1·464	1·465	1·464	1·469	1·473
N_Z–N_X (calc.)	0·010	0·010	0·011	0·011	0·013
$2V_Z$ (obs.)	65 ± 2°	68 ± 2°	63 ± 2°	64 ± 2°	67 ± 2°

Table 2. *Unit cell dimensions, cell volumes and densities*

	a_0	b_0	c_0	V	d (obs.)	d (calc.)
La-compound	16·07 Å	17·87 Å	19·50 Å	5·600 Å³	1·69 g.cm⁻³	1·69 g.cm⁻³
Ce-compound	16·05	17·70	19·39	5·508	—	1·72
Pr-compound	15·83	17·76	19·35	5·440	1·71	1·75
Nd-compound	15·81	17·76	19·31	5·422	—	1·76
Sm-compound	15·85	17·56	19·24	5·355	1·70	1·79

Table 3. *Agreements of observed and calculated values of* $Q_{hkl} = 1/d^2_{hkl}$

	La-compound		Ce-compound		Pr-compound		Nd-compound		Sm-compound	
hkl	Q_o	Q_c	Q_o	Q_c	Q_o	Q_c	Q_o	Q_c	Q_o	Q_c
001	—	0·00263	—	0·00266	0·00289	0·00267	0·00245	0·00268	—	0·00270
010	—	0·00313	—	0·00319	0·00344	0·00317	0·00309	0·00317	—	0·00324
100	—	0·00387	—	0·00388	0·00427	0·00399	0·00411	0·00400	—	0·00398
020	0·0126	0·0125	0·0127	0·0128	0·0129	0·0127	0·0128	0·0127	0·0130	0·0130
120	—	0·0164	—	0·0166	—	0·0167	0·0166	0·0167	0·0172	0·0169
202	0·0263	0·0260	—	0·0262	—	0·0266	—	0·0267	0·0259	0·0267
131	0·0349	0·0347	0·0348	0·0353	—	0·0352	0·0349	0·0352	0·0349	0·0358
301	0·0379	0·0375	0·0380	0·0376	0·0384	0·0386	0·0388	0·0387	0·0384	0·0385
004	0·0420	0·0421	0·0425	0·0426	0·0420	0·0427	0·0425	0·0429	0·0425	0·0432
320	—	0·0473	—	0·0477	—	0·0486	0·0481	0·0487	—	0·0488
231	—	0·0483	—	0·0469	—	0·0472	0·0481	0·0472	—	0·0478
040	0·0503	0·0501	0·0512	0·0510	0·0514	0·0507	0·0512	0·0507	0·0514	0·0518
024	0·0551	0·0546	0·0556	0·0553	—	0·0554	0·0554	0·0556	0·0564	0·0562
204	—	0·0576	—	0·0581	—	0·0587	0·0592	0·0589	—	0·0591
124	—	0·0585	—	0·0586	—	0·0594	0·0592	0·0596	—	0·0614
400	0·0622	0·0620	0·0622	0·0621	0·0638	0·0638	0·0638	0·0640	0·0647	0·0637
241	—	0·0682	0·0695	0·0692	—	0·0693	—	0·0694	—	0·0705
015	—	0·0689	0·0695	0·0697	—	0·0699	—	0·0702	—	0·0707
050	—	0·0782	—	0·0798	0·0795	0·0793	0·0790	0·0792	0·0802	0·0810
341	0·0884	0·0875	0·0891	0·0886	0·0903	0·0893	0·0901	0·0894	0·0909	0·0904
432	0·1010	0·1006	0·1000	0·1014	0·1029	0·1031	0·1029	0·1033	0·1035	0·1036
305	0·1010	0·1006	0·1000	0·1014	0·1029	0·1027	0·1029	0·1030	0·1035	0·1033
060	0·1127	0·1127	0·1138	0·1148	0·1150	0·1141	0·1141	0·1141	0·1166	0·1166
054	0·1211	0·1203	0·1222	0·1223	—	0·1220	—	0·1221	—	0·1242
107	0·1316	0·1317	0·1345	0·1342	—	0·1348	—	0·1353	—	0·1363
236	0·1385	0·1383	0·1396	0·1400	0·1406	0·1406	0·1410	0·1410	0·1417	0·1423
620	0·1523	0·1518	0·1513	0·1524	0·1538	0·1563	0·1557	0·1567	0·1560	0·1562
307	0·1632	0·1637	0·1650	0·1653	0·1665	0·1667	0·1670	0·1673	0·1685	0·1681
056	0·1732	0·1729	0·1767	0·1755	—	0·1754	—	0·1757	—	0·1782
454	0·1822	0·1823	—	0·1844	—	0·1858	—	0·1861	—	0·1879
256	0·1887	0·1884	0·1895	0·1900	0·1915	0·1913	0·1920	0·1917	0·1946	0·1941
080	0·1998	0·2003	—	0·2042	—	0·2029	—	0·2029	—	0·2074
009	0·2131	0·2130	0·2149	0·2155	0·2161	0·2163	0·2167	0·2171	0·2184	0·2187
029	0·2261	0·2255	0·2276	0·2282	—	0·2289	—	0·2298	0·2272	0·2317
527	0·2394	0·2381	0·2398	0·2401	0·2434	0·2433	0·2417	0·2440	0·2451	0·2447
660	0·2523	0·2520	0·2540	0·2545	0·2574	0·2578	0·2611	0·2581	—	0·2599
149	0·2668	0·2670	—	0·2704	—	0·2710	—	0·2718	0·2704	0·2745
0,3,10	0·2912	0·2912	0·2938	0·2947	—	0·2955	—	0·2965	—	0·2991
567	0·3390	0·3383	0·3429	0·3422	0·3432	0·3447	—	0·3454	0·3444	0·3484
10,0,0	0·3875	0·3870	—	0·3880	—	0·3990	—	0·4000	0·3981	0·3980

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Interatomic distances in uranium carbides.

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In a recent publication Austin (1959) determined the carbon positional parameters in the uranium carbides UC, U_2C_3, and UC_2 using neutron diffraction technique. In this note a treatment of the results obtained by Austin is presented which is different from that of Austin.

In his Table 5 Austin compared two sets of values of observed uranium radii in UC, U_2C_3, and UC_2 with 'Pauling radii' calculated on the basis of the well known equation of Pauling (1947) and allowing for carbon double-bond character in UC_2 and U_2C_3. One set of values corresponds to the observed (U–U)/2 distances. The second set is obtained by subtracting a carbon

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