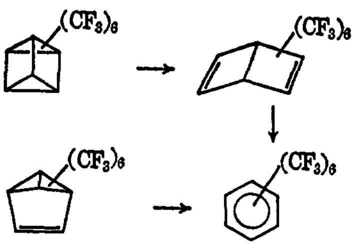

Figure 2. Thermal interconversions of the $(CCF_3)_6$ system.

Mass spectra (70 eV) of the four fluorocarbons are strikingly similar. In every case three peaks dominate the spectrum: m/e 467 (loss of F), 417 (loss of CF_3), and 69 (CF_3^+). Though the base peak varies, the other two are always >50% as intense. The parent peak increases in intensity from the prismane (4% of base) to the benzene (16% of base).

Highly strained fluorocarbons **1–3** appear to be the stablest (thermally) Dewar benzene,[8] benzvalene, and prismane[9] known at the present time. Steric effects are doubtless responsible in large measure for their impressive resistance to isomerization.[1] The Dewar benzene and benzvalene have half-lives at 234° of ~55 and ~9 min, respectively. It is interesting that their relative stability is opposite that found for the single other benzvalene–Dewar benzene pair which has been compared.[10] Haszeldine's group has reported that the prismane aromatizes at 170° at a rate intermediate between those of **1** and **2**, but in our hands the major product from **3** was the Dewar isomer **1** ($t_{1/2} \sim 7$ min at 234°).[11] All, or nearly all, of the benzene found could be accounted for by decomposition of **1** under the reaction conditions (see Figure 2).

Hexakis(trifluoromethyl)benzene is the first aromatic whose Dewar, benzvalene, and prismane isomers have all been obtained in pure form.[14] Thus these compounds provide a unique opportunity for studying the interrelationships of valence isomers of benzenes.

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(8) The locked "Dewar" anthracene prepared by D. E. Applequist and R. Searle is excluded from consideration since its geometry prevents aromatization (*J. Amer. Chem. Soc.*, **86**, 1389 (1964)).

(9) Hexakis(pentafluoroethyl)prismane, comparable in stability to **3**, is a possible exception.[1]

(10) H. G. Viehe, *Angew. Chem. Intern. Ed. Engl.*, **4**, 746 (1965).

(11) The other three prismanes whose thermal decomposition products have been reported give Dewar isomers,[12] exclusively in one case.[13]

(12) (a) K. E. Wilzbach and L. Kaplan, *J. Amer. Chem. Soc.*, **87**, 4004 (1965); D. M. Lemal and J. P. Lokensgard, *ibid.*, **88**, 5934 (1966); (b) W. Schäfer, R. Criegee, R. Askani, and H. Grüner, *Angew. Chem. Intern. Ed. Engl.*, 6, 78 (1967).

(13) R. Criegee and R. Askani, *ibid.*, **5**, 519(1966).

(14) In the tri-*t*-butyl and hexamethyl series all three ring systems have been found, but the prismane has not been obtained pure in the former nor the benzvalene in the latter series.[12a]

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The Absolute Configuration of the (−)-*cis*-Dichlorobis(ethylenediamine)ruthenium(III) Cation

Sir:

No ruthenium(III) complex has yet been assigned an absolute configuration. As a consequence of the resolutions[1] of both *cis*-$RuCl_2(en)_2^+$ and *cis*-$CoCl_2(en)_2^+$ with $Co(C_2O_4)_2en^-$ we now show that the diastereoisomers (−)-$RuCl_2(en)_2$-(−)-$Co(C_2O_4)_2en \cdot H_2O$ and (+) $CoCl_2(en)_2$-(−)-$Co(C_2O_4)_2en \cdot H_2O$ are isomorphous. (The signs refer to rotations in the sodium D line.) Making use of Jaeger's rule[2] relating configurations, as recently modified by Garbutt and Gillard,[3] the same absolute configuration can be assigned to both (−)-$RuCl_2(en)_2^+$ and (+)-$CoCl_2(en)_2^+$. The configuration[4] of (+)-$CoCl_2(en)_2^+$ has been related to the absolute D* configuration of (+)$Co(en)_3^{3+}$ so that (−)-*cis*-$RuCl_2(en)_2^+$ is here given an absolute D* configuration.

The diastereoisomer (−)-$RuCl_2(en)_2$-(−)-$Co(C_2O_4)_2en \cdot H_2O$ has already been described, but the mono- rather than the hemihydrate found previously was obtained.[1] The procedure for the Co(III) analog was as follows. Racemic $Na[Co(C_2O_4)_2en]$ was prepared and resolved by known methods.[5] (−)-$Na[Co(C_2O_4)_2en] \cdot H_2O$ (0.21 g) in water (2 ml) was added to 0.37 g of (±)-*cis*-$[CoCl_2(en)_2]Cl$ in water (8 ml) to give the purple diastereoisomer which was collected and washed with 50% ethanol. *Anal.* Calcd for $C_{10}H_{26}Cl_2N_6O_9Co_2$: C, 21.3; H, 4.6; N, 14.9. Found: C, 21.2; H, 4.5; N, 14.6. This diastereoisomer could be converted to (+)-$[CoCl_2(en)_2]I$ which had a molecular rotation of +2320 in the D line in good agreement with published values.[6] X-Ray data were obtained with Ni-filtered Cu Kα radiation. Bragg angles (θ) are given in Table I and confirm that the diastereoisomers are isomorphous.

Table I. Bragg angle Values for Ru(III) and Co(III) Diastereoisomers[a]

(+)-$CoCl_2(en)_2$-(−)-$Co(C_2O_4)_2en \cdot H_2O$		(−)-$RuCl_2(en)_2$-(−)-$Co(C_2O_4)_2en \cdot H_2O$	
6.80 s	11.53 m	6.80 m	11.45 m
7.20 w	12.39 w	7.18 m	12.35 m
7.70 vs	13.00 w	7.68 vs	12.90 w
8.30 m	13.90 s	8.28 m	13.80 m
8.84 m	14.60 w	8.90 m	14.60 m
9.15 m	18.00 w	9.10 w	17.92 w
9.60 m	18.60 w	9.64 m	18.50 w
10.60 s		10.60 s	

[a] s = strong, m = medium, w = weak.

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