The Optical Stability of a Chiral Germyl Radical

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Summary A chiral germyl radical produced from an optically active hydrogermane, 1-naphthylphenylmethylgermane, abstracts a chlorine atom from carbon tetrachloride to give the corresponding chlorogermane with retention of configuration.

THE individual enantiomers of the optically active hydrogermane, 1-naphthylphenylmethylgermane (R_3Ge^*H), prepared by slight modifications of the known method[1] were allowed to react with carbon tetrachloride in the presence of a catalytic amount of dibenzoyl peroxide at 80 °C. The resulting 1-naphthylphenylmethylchlorogermane (R_3Ge^*Cl) was obtained in almost quantitative yield with substantial retention of configuration as shown in the Table.

This finding is similar to the previous observation on the chiral silyl radicals,[2,3] demonstrating the non-planar structure of germyl radicals.

TABLE

Reaction of R_3Ge^*H *with* CCl_4 *in the presence of dibenzoyl peroxide at* 80°

Reactants (mmol)				Reaction time (h)	$[\alpha]_D$ of R_3Ge^*Cl
R_3Ge^*H		Dibenzoyl peroxide	CCl_4		
0·208	($[\alpha]_D$ +26·7)	0·02	4·16	11	−4·98
0·252	($[\alpha]_D$ −26·1)	0·02	2·52	11	+5·56

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