Crystal Structure of the Complex 1,2,6-Trichlorobis-(*o*-phenylenedimethylaminedimethylarsine)rhodium(III)

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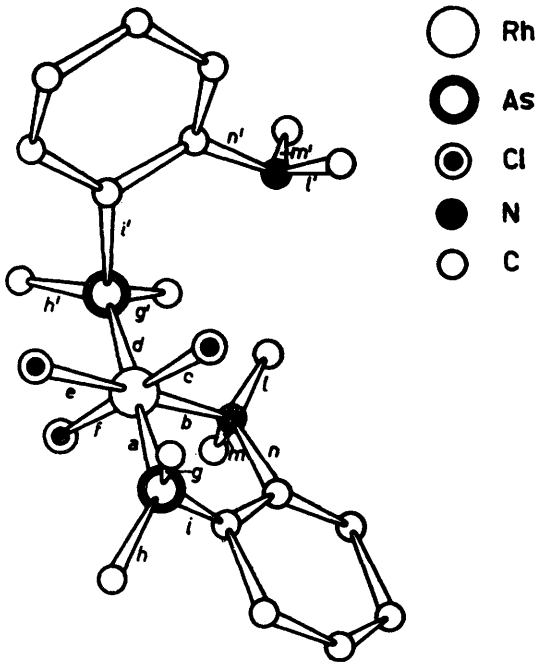
WE have been studying the 1 : 2 : 3-complexes of bidentate ligands having one arsenic and one nitrogen or oxygen donor with trivalent ions of the d^6 electronic configuration. Here we report the crystal structure of the complex trichlorobis(*o*-phenylenedimethylaminedimethylarsine) rhodium(III), $C_{20}H_{32}N_2Cl_3As_2Rh$. This is orthorhombic, $a = 14{\cdot}000 \pm 0{\cdot}012$, $b = 15{\cdot}723 \pm 0{\cdot}017$, $c = 11{\cdot}516 \pm 0{\cdot}012$ Å; space group $P2_12_12_1$ (No. 19), $D_m = 1{\cdot}71$, $D_c = 1{\cdot}74$ g.cm.$^{-3}$, $Z = 4$. The structure was solved by three-dimensional Fourier methods and refined by the least-squares method. The R index was 12% for 1260 reflections.

The Figure shows a perspective view of the molecule, and gives values of bond lengths and angles. There is no unusual contact between the different molecules in the unit cell.

a	2·34 Å	$\sigma_{a,d}$	0·007 Å	∠*ab*	88·6°	∠*ai*	100·4
b	2·27	$\sigma_{b,g,h}$	0·04	∠*ac*	91·1	∠*dg'*	112·0
c	2·35	$\sigma_{c,e,f}$	0·01	∠*ad*	174·5	∠*dh'*	121·7
d	2·53	$\sigma_{l,m,n}$	0·09	∠*ae*	88·3	∠*di'*	119·0
e	2·33	*g'*	1·93 Å	∠*af*	87·0	∠*nl*	110·3
f	2·29	*h'*	2·00	∠*db*	96·8	∠*nm*	105·6
g	1·92	*i'*	1·84	∠*dc*	87·9	∠*lm*	107·8
h	1·94	*l'*	1·47	∠*de*	86·2	∠*nb*	109·0
i	1·95	*m'*	1·47	∠*df*	93·7	∠*n'l'*	109·0
l	1·39	*n'*	1·50	∠*ag*	121·5	∠*n'm'*	110·0
m	1·38			∠*ah*	121·4	∠*l'm'*	109·0
n	1·53						

The difference between the two Rh–As bonds, *trans* to each other, is related to the chelating effect of one of the ligands. The chelate Rh–As bond shows a $d\pi$ orbital interaction whereas the other Rh–As bond exhibits a weak σ-dative character. The non-equivalence between the two arsenic atoms can be extended to the methylamino-groups in which the group, which is not co-ordinated, shows perfect sp^3 hybridisation geometry. The benzene rings show no significant deviation from normal geometry.



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