

## Preliminary communication

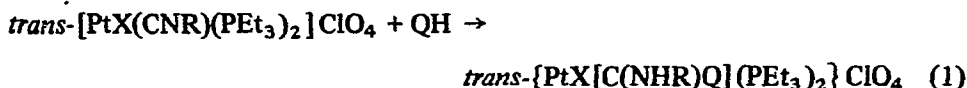
### The NMR spectra of carbene complexes of platinum(II)

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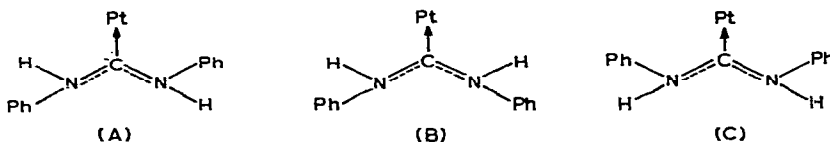
The carbene complexes of platinum(II) which we recently described<sup>1</sup>, *cis*-{PtX<sub>2</sub>[C(NHR)R<sup>1</sup>](PEt<sub>3</sub>)<sub>2</sub>} (X = Cl or Br; R = Ph or Me; R<sup>1</sup> = OMe, OEt, OPr-n, NPh, NHMe or NBu-s) are poorly soluble and reliable NMR spectra were not obtained. We have now synthesised, by a similar route, more soluble carbene complexes (Eq. 1), and have examined their <sup>1</sup>H NMR spectra.



(RNC = PhNC or MeNC; Q = PhNH, EtNH or EtO; X = Cl or Br)

The parent isocyanide complexes were prepared by the method of Church and Mays<sup>2</sup> and a *trans*-configuration can be assigned to these and the derived carbene complexes since the P-CH<sub>3</sub> resonance is a 1/4/6/4/1 quintet due to strong *trans*-phosphorus-phosphorus coupling<sup>3</sup>. The spectra are also consistent with free rotation about the platinum-carbon bond, as is found in the methoxycarbene analogues<sup>4</sup>.

Like the carbene complexes of chromium<sup>5,6</sup>, these compounds show restricted rotation about the C-N or C-O bonds of the carbene ligand. Thus two distinct phenyl patterns are seen for *trans*-[PtCl[C(NHPh)<sub>2</sub>](PEt<sub>3</sub>)<sub>2</sub>]ClO<sub>4</sub> in CDCl<sub>3</sub> solution (Table 1). Since spectra at 60 and 100 MHz and deuteration studies show that this pattern is not a doublet due to proton coupling, it could result from either configuration (A) of the carbene ligand, or an approximately equal mixture of configurations (B) and (C).



Since models indicate configuration (A) to be sterically favoured, and this is the configuration for the ion {CH<sub>3</sub>C[NH(CH<sub>3</sub>)<sub>2</sub>]}<sup>+</sup><sup>7</sup>, we consider configuration (A) predominates in solution. The other carbene complexes show similar restricted rotation and

TABLE 1  
 $^1\text{H}$  NMR SPECTRA OF CARBENE COMPLEXES <sup>a</sup>

Complex	$\tau$ ( $\pm 0.01$ )	$^3J(\text{H-C-C-H})$ (Hz $\pm 0.04$ )	$^3J(\text{H-N-C-H})$ (Hz $\pm 0.04$ )	Assignment
<i>trans</i> -{PtCl[C(NHPh) <sub>2</sub> ](PEt <sub>3</sub> ) <sub>2</sub> } <sup>+</sup>	(1.8–1.95) (2.6–2.9)	—	—	phenyl isomers
<i>trans</i> -{PtCl[C(NHPh)NHet](PEt <sub>3</sub> ) <sub>2</sub> } <sup>+</sup>	(1.9–2.1) (2.65–3.0)	—	—	phenyl isomers
	6.20	7.0	5.0	N-CH <sub>2</sub> -CH <sub>3</sub>
	8.64	7.0	—	N-CH <sub>2</sub> -CH <sub>3</sub>
<i>trans</i> -{PtCl[C(NHPh)OEt](PEt <sub>3</sub> ) <sub>2</sub> } <sup>+</sup>	2.3–2.9 4.95–5.4 8.55	— — 7.0	— — —	phenyl O-CH <sub>2</sub> -CH <sub>3</sub> O-CH <sub>2</sub> -CH <sub>3</sub>
<i>cis</i> -{PtCl <sub>2</sub> [C(NHPh)OEt](PPr-n <sub>3</sub> )}	(1.95–2.2) (2.7–2.85) 4.8–5.3 8.72	— — — 7.0	— — — —	phenyl isomers O-CH <sub>2</sub> -CH <sub>3</sub> O-CH <sub>2</sub> -CH <sub>3</sub>

<sup>a</sup> In CDCl<sub>3</sub> solution using tetramethylsilane as internal standard and a Varian HA 100 instrument.

assignments are given in Table 1. With alcohols reaction (1) does not go to completion and *trans*-{PtCl[C(OEt)NHPh](PEt<sub>3</sub>)<sub>2</sub>} ClO<sub>4</sub> was only obtained as a mixture with the parent phenylisocyanide complex, but the carbene ligand resonances could be assigned (Table 1).

Spectra of the *cis*-complexes containing PEt<sub>3</sub> may be obtained in (CD<sub>3</sub>)<sub>2</sub>SO solution, but a reaction occurs with the solvent. However, *cis*-{PtCl<sub>2</sub>[C(OEt)NHPh](PPr-n<sub>3</sub>)} is more soluble and exists as a mixture of isomers in CDCl<sub>3</sub> solution (Table 1).

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