

Preliminary communication

Isomerism in ruthenium(II) isocyanide complexes

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(Received December 7th, 1970)

With the exception of the complexes $\text{RuX}_2(\text{CNR})_4$ ($\text{X} = \text{Cl}, \text{Br}, \text{I}, \text{CN}$; $\text{R} = \text{alkyl or aryl}$)¹⁻³, compounds of ruthenium containing isocyanide ligands have been little investigated. I now report the preparation of some ruthenium(II) isocyanide complexes containing triphenyl-phosphine, -arsine and -stibine

The interaction of $\text{RuX}_2(\text{PPh}_3)_3$ ($\text{X} = \text{Cl}, \text{Br}$)⁴, $\text{RuX}_3(\text{AsPh}_3)_2(\text{CH}_3\text{OH})$ ($\text{X} = \text{Cl}, \text{Br}$)⁴, $\text{RuCl}_2(\text{SbPh}_3)_3$ ⁴ and $\text{RuBr}_2(\text{SbPh}_3)_4$ with ethyl isocyanide in an appropriate solvent (see Table 1) gives complexes of general formula $\text{Ru}(\text{EtNC})_2(\text{EPh}_3)_2\text{X}_2$ ($\text{E} = \text{P}, \text{As}, \text{Sb}$; $\text{X} = \text{Cl}, \text{Br}$). These can be isolated as yellow to red, air-stable crystals. Their IR spectra show only one band of significant intensity in the $\nu(\text{NC})$ region (Table 1), indicating a *trans* configuration for the EtNC ligands.

When the *trans* complexes are heated dry at 240° or in refluxing 2-methoxyethanol, isomerisation occurs, and the complexes *cis*- $\text{Ru}(\text{EtNC})_2(\text{EPh}_3)_2\text{X}_2$ can be isolated as colourless to yellow, air-stable crystals. A *cis* configuration is assigned to the EtNC groups on the basis of their IR spectra in the $\nu(\text{NC})$ region. Similar isomer-

TABLE 1

Compound ^a	Colour	$\nu(\text{NC})^b$	Reaction solvent
<i>trans</i> - $\text{Ru}(\text{EtNC})_2(\text{PPh}_3)_2\text{Cl}_2$	Yellow	2146vs	Acetone
<i>trans</i> - $\text{Ru}(\text{EtNC})_2(\text{PPh}_3)_2\text{Br}_2$	Orange	2183vw, 2135vs	Acetone
<i>trans</i> - $\text{Ru}(\text{EtNC})_2(\text{AsPh}_3)_2\text{Cl}_2$	Orange	2146vs	Methanol
<i>trans</i> - $\text{Ru}(\text{EtNC})_2(\text{AsPh}_3)_2\text{Br}_2$	Red-brown	2185vw, 2140vs	Methanol
<i>trans</i> - $\text{Ru}(\text{EtNC})_2(\text{SbPh}_3)_2\text{Cl}_2$	Orange-pink	2136vs	Chloroform
<i>trans</i> - $\text{Ru}(\text{EtNC})_2(\text{SbPh}_3)_2\text{Br}_2$	Red	2135vs	Chloroform
<i>cis</i> - $\text{Ru}(\text{EtNC})_2(\text{PPh}_3)_2\text{Cl}_2$	White	2182vs, 2139vs, ~2110sh, w	2-Methoxyethanol
<i>cis</i> - $\text{Ru}(\text{EtNC})_2(\text{PPh}_3)_2\text{Br}_2$	Very pale yellow	2186vs, 2137vs, ~2115sh, w	2-Methoxyethanol
<i>cis</i> - $\text{Ru}(\text{EtNC})_2(\text{AsPh}_3)_2\text{Cl}_2$	Pale yellow	2181vs, 2140vs, ~2110sh, w	2-Methoxyethanol
<i>cis</i> - $\text{Ru}(\text{EtNC})_2(\text{AsPh}_3)_2\text{Br}_2$	Pale yellow	2187vs, 2142vs, ~2115sh, w	2-Methoxyethanol
<i>cis</i> - $\text{Ru}(\text{EtNC})_2(\text{SbPh}_3)_2\text{Cl}_2$	Yellow	2165vs, 2127vs, ~2105sh, w	2-Methoxyethanol
<i>cis</i> - $\text{Ru}(\text{EtNC})_2(\text{SbPh}_3)_2\text{Br}_2$	Yellow	2168vs, 2121vs	2-Methoxyethanol

^aSatisfactory elemental analyses (C, H, N, halogen) obtained for all compounds. ^bNujol mull̄s.

isations have been observed in octahedral ruthenium(II) dicarbonyl^{4,5} and bis-nitrile⁶ complexes.

Far infrared studies are in progress to determine the configuration of the other ligands in these complexes.

ACKNOWLEDGEMENTS

This work was carried out during the tenure of an Earl Grey Memorial Fellowship. I wish to thank Messrs. Johnson, Matthey Ltd., for a loan of ruthenium trichloride.

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J. Organometal. Chem., 27 (1971) C17-C18