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New Directions in the Development of Water-Soluble Phosphines and Transition Metal Compounds

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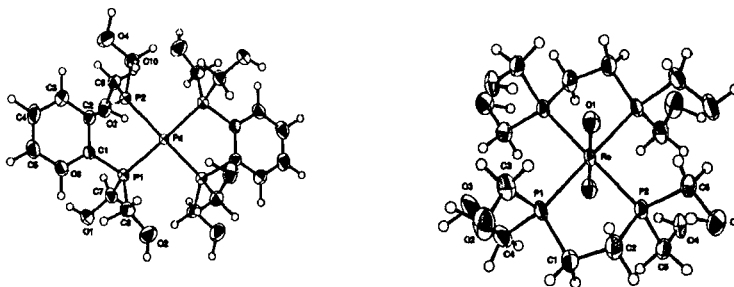
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New Directions in the Development of Water-Soluble Phosphines and Transition Metal Compounds

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The water-soluble bisphosphines, 1,2-bis(bis(hydroxymethyl)phosphino)benzene ("HMPB") (1) and 1,2-bis(bis(hydroxymethyl)phosphino)ethane ("HMPE") (2) were synthesized in near quantitative yields by the catalytic hydroformylation of $\text{H}_2\text{PC}_6\text{H}_4\text{PH}_2$ and $\text{H}_2\text{PCH}_2\text{CH}_2\text{PH}_2$ in the presence of formaldehyde in aqueous media.^{1,2} The reactions of these chelating bisphosphines 1 and 2 with $\text{Pt}(\text{COD})\text{Cl}_2$ and $\text{Pd}(\text{PhCN})_2\text{Cl}_2$ produced water-soluble Pt(II) and Pd(II) complexes $\text{M}[(\text{HOH}_2\text{C})_2\text{PC}_6\text{H}_4\text{P}(\text{CH}_2\text{OH})_2]_2\text{Cl}_2$ ($\text{M} = \text{Pt}$, 3; Pd , 4) and $\text{M}[(\text{HOH}_2\text{C})_2\text{PCH}_2\text{CH}_2\text{P}(\text{CH}_2\text{OH})_2]_2\text{Cl}_2$ ($\text{M} = \text{Pt}$, 5; Pd , 6) respectively. The reactions of 1 and 2 with $\text{Re}(\text{O})_2\text{I}(\text{PPh}_3)_2$ and $[\text{Re}(\text{O})_2(\text{NHC}_4\text{H}_9)_4]\text{Cl}$ to produce new water-soluble Re(V) complexes are also described. All the new compounds were characterized by ^1H and ^{31}P NMR spectroscopy. X-ray structures of representative Pd(II) and Re(V) complexes as shown below confirmed the chemical constitution of this new generation of water-soluble metal complexes.



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 [1] Reddy, V. S., Katti, K. V. and Barnes, C. L., (Submitted).