

MS30-P29 Structure of carbonyl isocyanide complexes with Rhenium and Manganese: carbon monoxide releasing molecules for biological applications

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CO releasing molecules (CORMs) are widely investigated in synthetic and medicinal chemistry owing to the potential therapeutic applications of the gas. Medical scrutiny of CORMs pivots around treatment of inflammations, microbial infections and organ injuries. Organometallic carbonyl complexes are best suited to play the role of CO carriers as they allow the exogenous release of CO under controlled conditions and permit to overcome the toxicity of the gas. With the long-term goal of developing CORMs with similar properties to those of the *sesta*-methoxyisobutylisonitrile (MIBI) ^{99m}Tc complex (Cardiolite), we have studied the reactivity of isocyanide ligands (namely tert-butyl (tbu), isopropyl (ipp), cyclohexyl (chx), S-methylbenzyl (smb), tetramethylbutyl (tmb), and MIBI) towards 16-, 17-electron *cis*-[Re(CO)₂Br₄]⁻²⁻ species and the [Mn(CO)₅Br] complex. Group 5 metal ions were selected as Re and Mn-based CORMs show low cytotoxicity and demonstrated a protective action against ischemia-reperfusion injuries. A total of 6 different isocyanide ancillary ligands (CNR's), including MIBI, were selected for this study. Their reaction with the *cis*-dicarbonyl Re(III) and Re(II) complexes was accompanied by a 2 or 1 electron reduction of the metal center and resulted in the formation of stable *cis-mer*-[Re(CO)₂L₃Br] species (where L = CNR), while the same reactions with [Mn(CO)₅Br] gave *fac*-[Mn(CO)₃L₂Br] compounds. All complexes were characterized including single-crystal X-ray diffraction structure determinations. In addition, unique monocarbonyl species were obtained from the reactions of *cis*-[Re(CO)₂Br₄]⁻²⁻ with tert-butyl-isocyanide and *cis*-[Re(CO)₂Br₄]⁻²⁻ with MIBI. The species, an heptacoordinated Re(III) and a hexacoordinated Re(II) complex, could also be isolated and structurally characterized. The CO releasing, the cytotoxicity and antibacterial properties of the compounds were also investigated.

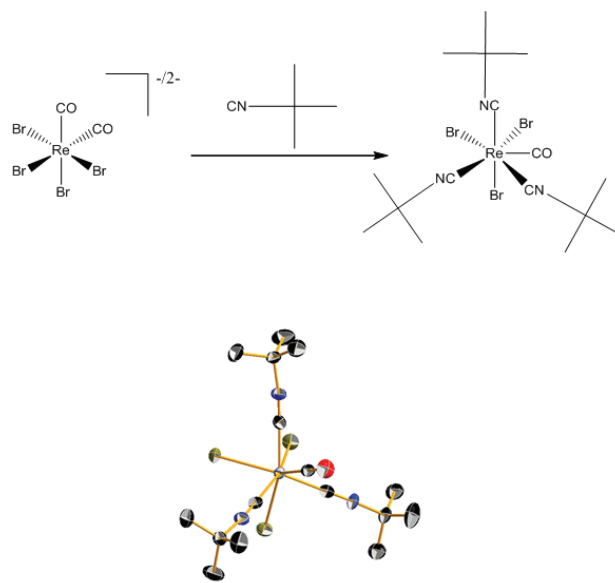


Figure 1. Reaction of [Re(CO)₂Br₄]⁻²⁻ with tert-butyl isocyanide ligand, giving the heptacoordinated d⁴, 18e⁻ complex

Keywords: CORM, isocyanide, rhenium, manganese, biocompatible