

**On the synthesis of doubly bridged cluster complexes with up to four different core metal atoms starting with educts of the type  $MM'(\mu-H)(\mu-PR_2)(CO)_8$**

**( $MM' = Mn_2, MnRe, Re_2$ ;  $Y = H, PR_2$ ;  $R = \text{organic residue}$ )**

This Ph. D. thesis describes the development of synthetic routes for a systematic build up of doubly bridged cluster complexes with two to four different core metal atoms  $M^1M^2(M^3L)(M^4L)(\mu-Y)(\mu-PR_2)(CO)_6$ .

Doubly phosphido bridged metallatetrahedranes of the type  $M^1M^2(M^3L)(M^4L)(\mu-PR_2)(\mu-Y)(CO)_6$  were synthesized in four steps starting from  $M^1M^2(\mu-H)(\mu-PR_2)(CO)_8$ . The following systems were obtained: a)  $M^1 = M^2 = Re$ ;  $R = Cy, Ph$ ;  $Y = PPh_2, PCy_2, PEt_2$ ;  $M^3L = AuPR_3'$ ;  $M^4L = AuPR_3', AgPR_3'$ ;  $R' = Cy, Ph, Et$ . b)  $M^1 = Mn, M^2 = Re$ ;  $R = Cy$ ;  $Y = PPh_2$ ;  $M^3L = M^4L = AuPPh_3$ . The synthesis of metallatetrahedranes with four different metal atoms was successful in the case of phosphido and acyl bridged cluster complexes like e.g.  $MnRe(AuPPh_3)(HgMoCp(CO)_3)(\mu-PCy_2)(\mu-C(n-Bu)O)(CO)_6$ . This kind of cluster complexes is accessible in a three step synthesis. On trying to prepare a PH functionalized doubly phosphido bridged metallatetrahedran the novel cluster complexes  $M^1M^2(AuPR_3)_2(\mu-H)(\mu-PCy_2)(\mu_4-PCy)(CO)_6$  were obtained. They exhibit for  $M^1 = M^2 = Mn$  or  $Re$  a fluctuating behaviour while the heteronuclear compound ( $M^1 = Mn, M^2 = Re$ ) is structurally rigid.

Furthermore, the first preparations of gold(I) acylcomplexes  $Re_2(\mu-PR_2)(CO)_7(OC(AuPR_3')R'')$  [ $R = Ph, Et$ ;  $R' = Ph, p-C_6H_4F, p-C_6H_4OMe, o\text{-tolyl}, Me, Et, i\text{-Pr}, Cy$ ;  $R'' = n\text{-Bu}, t\text{-Bu}, Me, Ph, N(i\text{-Pr})_2, NCy_2$ ] are reported. The acyl oxygen is co-ordinated to a Rhenium atom of the dirhenium complex. All attempts to isolate the free gold(I) acylcomplexes failed due to the labile Au-C bond.