STRUCTURAL MODIFICATIONS IN THE CARBON SPHERE OF A DIRHODIUM COMPLEX

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Carbon allotropes vary significantly in their chemical and physical properties and have a wide range of applications, not only the commonly known diamond and graphene, but also the non-graphitizing carbons such as carbon black, activated carbon and glassy carbon. While for the first two types, the structures are well understood and show only sp^3 or sp^2 hybridization of the carbon atoms, the nature of the carbon bonds in the latter examples is not as well defined. Additionally, the binding of metal atoms onto such carbon surfaces significantly changes many characteristics of the material. Unfortunately, such systems are challenging to characterize due to their heterogeneous nature. We here present a homogeneous model substrate for metal atoms deposited on carbon support materials, where a dirhodium core is coordinated to a carbon-rich ligand exhibiting a variety of carbon functional groups. When this dirhodium complex was treated with reductant or base, unexpected rearrangements of the carbon network take place, as depicted in Figure 1. The herein presented metal complexes allowed for thorough characterization by structural, spectroscopic and electrochemical methods, which were complemented by DFT calculations. The observed structural changes in the carbon ligand framework show a strong influence on the redox properties of the complexes and give insight into possible modifications happening on carbon support materials.

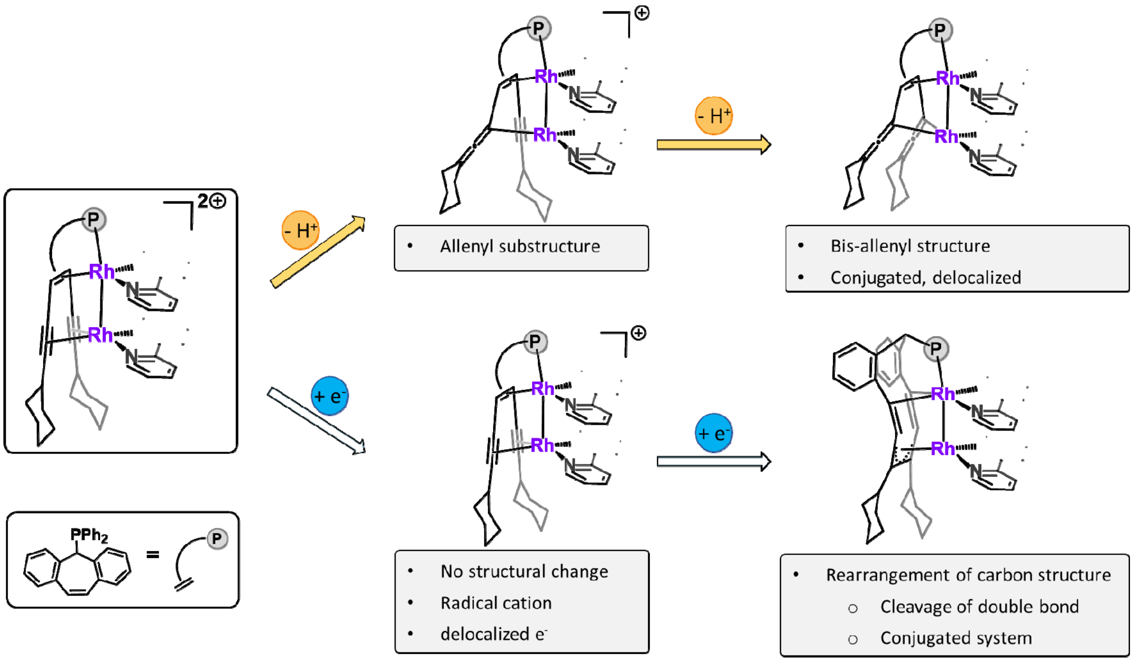

Figure 1. Investigated dirhodium complex and its single and double deprotonation (top) and reduction (bottom) showing the structural changes occurring in the carbon framework.