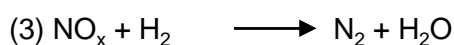
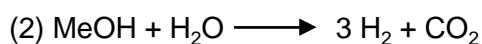
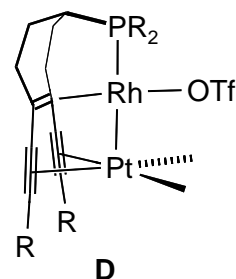
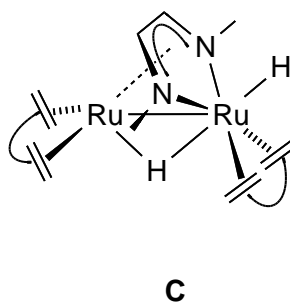
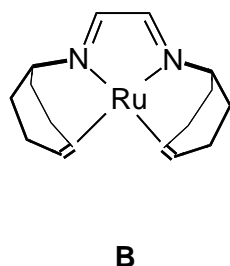
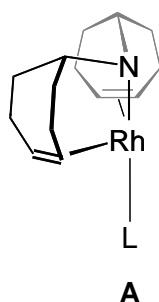
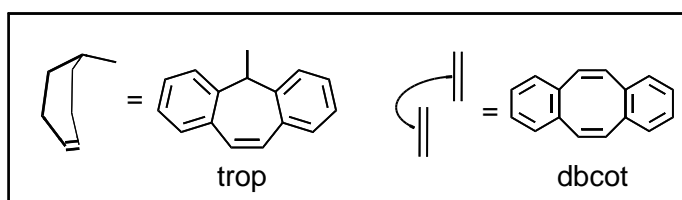


Selected hydrogenation and dehydrogenation reactions with low-valent olefin metal complexes

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Olefins stabilize complexes with metal center in low-oxidation states. And when special structural requirements are met, these are remarkably stable and can be used in various hydrogenation and dehydrogenation reactions in aqueous solution. In this lecture we will give a short overview about olefin ligands which allow to prepare low-valent 16 electron rhodium amido complexes **A** with an unusual “butterfly” structure, square pyramidal ruthenium complexes **B** or dinuclear ruthenium hydride complexes **C** (both with “suspicious” oxidation states at the metal centers), or the heteronuclear RhPt complex **D**.



Complexes such as **A** allow to construct Organometallic Fuel Cells or Organometallic Electrolyzers of aqueous alcohol solutions [eq. (1)]. Complex **B** catalyzes in eq. (2) the complete and clean conversion of aqueous methanol or formaldehyde solutions into hydrogen and CO_2 (which can be captured on-board). And the dinuclear complexes **C** and **D** allow to convert nitrogen oxides in homogeneous solution into N_2 and water [eq. (3)]. Some insight into the mechanisms of these reactions will be presented.