

ALKENE-OXO AND ALKENE-ALKENE COUPLING ON Pt(II)

Endre Szuromi

Dr. Paul R. Sharp, Dissertation Supervisor

ABSTRACT

Tetranuclear Pt(II) oxo-complex $[(\text{COD})_4\text{Pt}_4(\mu^3\text{-O})_2\text{Cl}_2](\text{BF}_4)_2$ (**1**) (COD = 1,5-cyclooctadiene) was found to readily react with a variety of alkenes (ethylene, norbornene, propylene and cyclopentene). The most significant discovery resulted from the norbornene reaction, which gave platinaoxetane $[(\text{COD})_2\text{Pt}_2(\text{OC}_7\text{H}_{10})\text{Cl}]\text{BF}_4$ (**4**), the first metallaoxetane obtained from the direct reaction of an oxo complex and an alkene.

A facile alkene-exchange reaction was observed between platinaoxetane **4** and norbornene-derivative **5** giving a new platinaoxetane and free norbornene. Kinetic studies revealed that the reaction is catalyzed by possibly more than one electrophilic catalyst. We describe two probable mechanisms for the reaction.

Cationic Pt(II) complexes $(\text{COD})\text{Pt}(\text{OTf})_2$ and $[(\text{COD})\text{Pt}(\text{THF})(\text{OTf})]\text{OTf}$ were found to readily react with alkenes such as norbornenes, cyclopentene, propylene and ethylene. Two common features of these reactions were alkene C-H bond cleavage and triflic acid elimination. Norbornenes, cyclopentene and ethylene gave alkene-coupled products, while propylene resulted in a simple allyl complex.