Synthesis And Characterization Of Potentially Catalytic Tolunitrile Adducts Of Rhodium(II) Acetate

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The objective of this research is to synthesize, fully characterize, and investigate the catalytic properties of a series of rhodium(II) acetate derivatives. On its own, rhodium(II) acetate possesses the ability to catalyze the formation of cyclopropanes—strained, three-carbon rings that are a defining structural feature of the group of insecticides known as permethrins (found naturally in chrysanthemum flowers). Alone, though, the rhodium(II) acetate 'paddlewheel' structure does not selectively catalyze the formation of the biologically active version of the cyclopropane product; a mix of products is created that must then be separated. The separation process is expensive in time and % yield. With every step in the purification of the permethrin mixture, a significant amount of product is sacrificed. Thus, the permethrins in their commercial pure form are prohibitively expensive for most desired applications. Extracted permethrins are only used in the treatment of head lice and as flea/tick treatment of pets. Hoping to enhance the catalytic complex's selectivity for the biologically active cyclopropane confirmation (atomic arrangement), we have attached a p-tolunitrile ligand (molecular 'adduct') to rhodium(II) acetate.The complexes thus synthesized have been characterized by Single Crystal X-ray Crystallography, IR, NMR and UV-visible spectroscopies and elemental analysis. We are currently investigating the catalytic properties of the nitrile adducts of rhodium(II) acetate.